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R. H. STINCHFIELD, *Editor*

Editorial Office: 1155 16th Street, N. W., Washington 6, D. C.

VOLUME XXXII NO. 4

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Horseless days since . . . . .

Exit the Equine

Jeff McDermid

WE were wont to marvel much about the horseless carriage and the horseless plow, but today we pay scant attention to our horseless farm statistics, which crop reporters lay before us with each year's livestock inventory. Everyone is so crazy to get hold of one of these new-fangled tractors with hot and cold running water and three speeds forward and two speeds backward, or pre-emergence weed dope applicators that will lay the corn by almost before it sprouts—just too busy to pay heed to the work horse and his welfare.

Our equine cooperators are on the way out. Some farms have none; others have a few relics yet, to show to the kids when it's too rainy to visit the zoo; and a town that has a first-class harness shop on Main Street doesn't know whether to brag or apologize for it when the Rotary meets. I hear that the slump in horse numbers is worst in the Midwest, and that some professors out there are talking about stuffing a few specimens.

I doubt if those long-tailed, wart-nosed, prehistoric behemoths disappeared as fast in their era as the draft horse has skated to oblivion during the last decade. Thumbing into my overworked and tattered figure book, I find that in 1941 there were about 10 million horses reported on all U. S. farms, while

in the present season we have only 6½ million head to hitch up in case the iron broncho breaks down, and only 185,000 yearling colts in the whole picture.

And as for mules, we stand at the low point for these tough roustabouts since the Democrats lost with Bryan in 1896. (Kindly disregard any campaign significance in this reference.)

Along with this red light they have hung over the convenient exit doorway for the loyal old farm teams, who put us first on the glory road, there is a smoky cloud on the horizon which looks like an exhaust. We are in for a considerable spell of low oil supplies for fuel and lubrication, right when we have proudly converted 85 per cent of our soil working and crop harvesting and processing from the muscles of old Dobbin to the spark plug, combustion cylinder, and transmission gear.

They say it isn't under-production so much as a keen over-consumption that puts us in this nasty, greasy spot. I think meanwhile that I hear Missouri mules a-braying, and I can hear the brawny, retired blacksmith giving us the horse laugh underneath his chestnut tree. I expect to hear a lot of consumers squawking too, if this oil-fired scarcity cuts down on the pork roast and the batter cakes. It doesn't do much good to tell us we can't change horses in the midst of a deep creek, because there are no such animals to change.

IF we were back in the old days, when coal-oil lamps and axle-grease just about summed up the volume of oil we used on farms, there would be plenty left for the tourists and night clubs; whereas as it appears this spring, some states will be obliged to do some regimenting in gasoline alley—even when it's not popular to deprive your constituents of pleasure power. Verily, the path of the political fence-mender this summer is much beset with carking cares.

Yes, the horse and mule men will say, "We told you so," especially since we have pointed with pride to the transfer of some 80 million acres from necessary feed and fodder plots for horses and mules to a cash income acreage, on which to grow export wheat or anything else that looks like a temporary bonanza.

But, of course, this oil shortage is not going to save the horse and his second cousin from going west and jumping into the setting sun—like the candle, the covered wagon, the parlor heater, and the family-sized four-holer away out behind yonder. Nary a bit, for this machine age never turns back; and it will soon dig up some gadgets to save fuel or increase octane ratings, or produce fuel automatically from the air, or from radioactive piles (already "itching" to be done).

FRIENDS of the horse have long ere this tried to pry loose some helpful statistics and farm-management studies to prove without cavil that the farmer who thinks he is making much money via the gas-power route is really losing considerable, when the entire cash tied up in the implement investment is totaled. I have read some of these last-ditch lectures, but few ever pay them much heed. Even the wheeze that a tractor can't have a colt doesn't seem to register out there where the yokels clamor for more belt and draw-bar dynamics.

According to my pocket notes, the shift being made now by the horse lovers seems to be toward light saddle mounts, and they hope to promote fancy-riding shows out there where the corn-shucking contests occur. But what chance have they in an age when a farmer on 160 acres thinks he ought to keep an airplane to scout his fence lines and keep tab on his neighbors? Except for the real western horse devotee who lives on terrain suited to wiry mustangs, you won't work up much lather for saddle nags on the kind of farms I am acquainted with. You can get shook up twice as good on a modern jeep.

And besides, if we grew too many light show horses on our farms, too many youngsters would leave them to join up with a rodeo. Most farmers would prefer to have their sons stay at home and pack an impervious top-layer on their land with heavy tractors and trailing outfits.

When a friend of mine the other day wagered a tire against a horse collar that I hadn't had a buggy ride in 15 years and that my kids never enjoyed one in their lives, I refused to take the bait. My own memories of draft-horse field power center mostly on a corn

cultivator, or maybe leading one horse while Father yanked the plow. Hence these memories of a museum nature will dwell on the family nag as a means of transportation. My last ride behind a team was more than a decade ago, bundled up in a bob-sled because the roads were not then so quickly smoothed with motor equipment.

Thanks to the reliability of auto engines I have owned in the past before they were priced beyond me, my children have never taken a journey in a horse-drawn vehicle. They have seen a few of them faring cautiously along on the extreme outer fringes of our oil-spotted highways; but strange to say, the anxious expressions on the faces of the drivers of such ancient outfits have never appealed to my kids as a source of new thrills. Modern youth prefers to remain on the offensive side of dangerous things.

We of the bygone equine age were often on the defensive. We were that way when a new and untried horse was purchased, and we remained that way against tangled harness, axle-grease, ammonia fumes, colic, fistula, bots, poll evil, and distemper. Yet how glorious was that defensive even figuring in a runaway episode, accompanied by a timid flapper of the Floradora vintage, whose encircling arms were antidote against an upset. Wild colts with tough mouths afforded nearly as much excitement as a motor car on the brink of a gulley.

Undertaking a journey to cousins in Watertown, 35 miles away, called for much detailed foresight, as well as punctuality at breakfast on the dawn of our departure. We had to remember such necessities as lunch basket, tin cups, bottles of cold tea, arnica, liniment, the rope halter and tie strap, wrenches, lap-robes, flynets, side curtains, and a bag of oats.

Father's kindly face had an uneasy dignity beneath a stiff, black derby, which he scorned to wear around home. Mother and the girls played their courageous best in whatever little adornments their happy ingenuity and slender means afforded. The habiliments of the delighted small boy, perched beside his Dad on the front seat of the buggy, held little concern for him.

"WE must favor old Kit for the first 10 miles, until we get to Cringle's Corners," was the policy laid down by Father, as he clucked to the mare and we rode past the windows of envious neighbors. The old imposter in the shafts was allowed to lag along in shambling style until we hove in sight of Cringle's corners. But by that time the sun was scorching hot, the dust puffing up in stifling clouds, and Mother discovered that Kit was sweating a white foam where the harness rubbed her hinder. So this meant a rest for the mare under an elm tree, at which time lunch was uncovered and messed around from hand to hand. Sometimes

(*Turn to page* 50)

Fig. 1. Alfalfa like this reduces the problem of erosion, drainage, and aeration.

Legumes Improve Drainage and Reduce Erosion

By R. S. Stauffer

Illinois Agricultural Experiment Station, Urbana, Illinois

ONE of the most important, if not the most important, problems in the world today is to produce more food. The high production of agricultural products, particularly in the United States, and more particularly in the great Midwest, was an important factor in winning the recent "shooting" war. We all hope that we will not be driven to maximum production again by war, but it would give us a comfortable feeling to know that our soils are capable of high production if it does become necessary. Even if we never have another war, it is essential that our soils are not permitted to deteriorate. We cannot be a strong nation if our soils are exhausted.

It has been said that the only way to appeal to farmers is on a dollar and cents basis. If a certain practice will increase their income, they will follow it; otherwise they are not interested. This is not true of all farmers any more than it is true of all those in other industries. Some are interested in the future as well as in the present. I agree with the African Chief, of the country of Nigeria, who is credited with saying, "I conceive that the land belongs to a vast family, of which many are dead, few are living, and countless numbers are still unborn." It is fortunate that in many cases soil conservation measures do increase income as well as help to maintain the soil.

The contribution of legumes to soil maintenance and improvement is being emphasized in our programs today. This is not a new subject. The importance and value of legumes, and particularly deep-rooted legumes, in farming have been stressed for many years. Sometimes it seems that farmers have heard this topic discussed so often that it no longer makes any impression on them. At least the small acreage of deep-rooted legumes in the Corn Belt indicates that farmers are not taking the legume idea very seriously. This does not mean that deep-rooted legumes are not important. It simply means that we are willing to let our soils deteriorate still further before doing anything about it.

Need for Conservation

Our Illinois soils have taken an awful beating during the last three or four generations, and on many farms are still producing good yields. This is mainly because they were unusually good to begin with. In the eastern part of our country vast areas, hundreds of thousands of acres, of land once farmed are no longer cultivated. Much of this land never should have been farmed, at least like it was farmed. As a people we did not suffer much when these farms were abandoned because we had the Midwest to produce food. Now millions of acres of soils in the Midwest have been destroyed or badly damaged and the destruction is still going on, in many cases at an accelerated rate. This must be stopped or in the not too distant future we are going to be numbered among the "have nots" so far as food is concerned. It looks to me like this is our last chance. If we allow the soils of the Midwest to be destroyed, we are through as a nation of abundant food. New lands suitable for cultivation are very limited in extent. We had better take care of what we have.

I realize there are many angles to the soil conservation problem. It includes all things necessary to keep the soil productive. The physical problems, with which I concern myself chiefly, cover a wide field, including soil and water relations.

Water Absorption Necessary

To produce satisfactory crop yields a soil must absorb water readily, hold large quantities for plant use, and permit the excess to drain away quickly. All these are important, but I must limit myself now to drainage and particularly to those soils in the Corn Belt that at one time apparently drained satisfactorily but no longer do. Those who operate such farms realize that something is wrong, but relatively few are convinced that they cannot keep on growing cultivated crops year after year and get away with it indefinitely. Sometime we will be forced by necessity to do something about it if we do not want to go hungry. Just how soon that will be on a particular farm depends upon the soil condition on that farm at the present time and how it is handled from now on. On many farms it certainly will not be long if they are to be kept in production. If something were done to remedy this condition before we are driven to it by necessity, it would be so much better in every respect for all concerned.

Some of these dark-colored soils that drain more slowly than formerly have been tiled and apparently drained satisfactorily for years after tiling. If additional tile drains were installed they might drain pretty well again for a while. But if these soils are kept in cultivated crops or annual grain crops continuously, it will be only a matter of time until they will not drain. Putting in more tile drains is not a permanent solution to the problem. It may give temporary relief but will not cure the trouble. Something else must be done.

The reason that these good soils drain more slowly than formerly is because the soil is not loose and granular as it once was. The soil granules which are made up of clusters of par-

ticles are gradually being broken down. Fine-textured soils, those made up largely of fine particles, are very impervious to air and water when the individual particles exist and function alone. Unless the fine particles exist in clusters or granules the soil will be poorly drained and poorly aerated. Many of the particles in silt loams, clay loams, and clays are so small they cannot be seen under a high-powered microscope. These minute particles must be held together in clusters or granules if the soil is to drain satisfactorily. A large percentage of the soils of Illinois belong in this fine-textured class. A fine-textured soil not in a granular condition has a small amount of space between particles and the spaces are too small for water to flow through or for adequate movement of air. Drainage is too slow and more water runs off over the surface, increasing erosion.

I am concerned when I hear a man saying, "I can use a rotation of corn and soybeans on my soil because it is level and does not erode." In the first place it is likely to erode more than he suspects, but even if there were no erosion the physical condition of most Illinois soils will become poorer and the time will come when they will not drain if managed this way. Fertilizers alone will not maintain this granular condition of soils. Just how long it will take to develop this undesirable physical condition under corn and beans depends on the kind of soil and the condition it is in now. Farming a soil hard, working it a lot with tillage implements, particularly when too wet, and keeping it in intertilled crops and grains all the time without growing clovers and grasses will put any fine-textured soil in bad physical condition in time. Heavy farm machinery, particularly when used on soils that are too wet, has aggravated the problem of soil compaction. Many good Illinois soils are definitely showing the effects of such hard treatment.

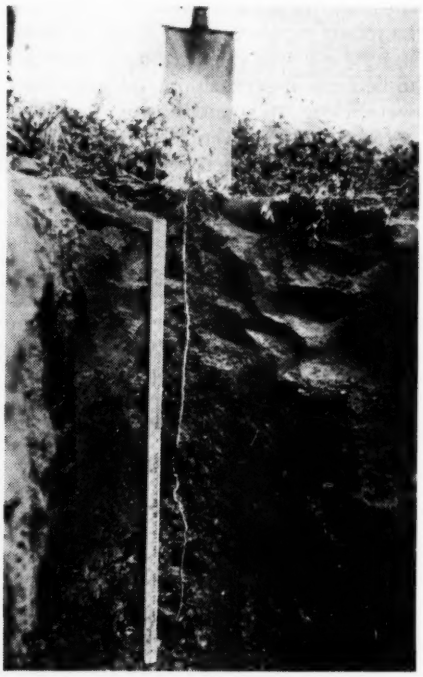

Fig. 2. Sweet clover roots loosen up compact soil that has grown too much corn and soybeans.

Dark-colored prairie soils possessed a very desirable structure when first put under cultivation. They were well granulated. Today they do not possess as good structure as they did formerly. Crop yields are still relatively high on many farms but with improved varieties of crops and the increased use of fertilizers average yields should be higher than they are. Fertilizers are necessary but they alone will not solve the problem of soil structure and drainage.

What can be done about it? Keep a cover on the soil, preferably a growing crop, as much of the time as possible and include in the rotation grasses and deep-rooted legumes. Use every available bit of organic matter to maintain this essential constituent. Do not burn the trash from crops. Trash makes a good cover and is a good source of soil organic matter.

Land completely covered with vegetation, whether it be grass, legumes, shrubs, or trees, is protected from beat-

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Farm Problems of the Cotton Belt*

By M. J. Funchess

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Dean, School of Agriculture, and Director, Agricultural Experiment Station
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THE area of our country commonly known as the South has at one time or another been referred to as the Nation's Economic Problem No. 1 and the Nation's Opportunity No. 1. After reading what has been written under either viewpoint, one is frequently caused to wonder if the writers who use such phrases really know enough about the South to talk or write about it very intelligently. As of the moment, I think the South is the Economic Problem No. 1, but I do not think it needs to remain so if agricultural workers who serve the South fully understand what are some of the causes of the poor economic status of Southern farm people. It is essential that they do. I am confining this paper to a discussion of some of the really important problems of the area and the possibilities of solving them so as to justify, at least in part, some of the claims that our area offers Economic Possibility No. 1 in the Nation.

The fundamental farm problem of all the Southern States is the low per capita income of their farmers. This is particularly true in Alabama. Southern farm people would like to have good homes, adequate home equipment, good schools, churches, hospitals, medical facilities, and many other things that money will buy. Our wants and needs are not materially different from those of people of other sections. However, we have too little income to support our needs on anything like the level of other agricultural sections of this country, and, until we have a relatively higher income, there is little chance to improve our relative position. The relatively low farm income in the South can be increased if we really understand what our most important problems are, and especially our "bottleneck" problems. Let me repeat that the first essential is that we know where we are and the direction that we should go from there. In the main, low production per acre, low production per day's labor, and too few acres in commercial agriculture are the major problems of southern agriculture. And, since competition for markets is as keen in agriculture as in other enterprises, economic production, and not just increased production alone, must be the major goal.

Low Production Per Man Hour

Time limitations prevent giving many examples of the high requirement of human labor in much of Southern agriculture. Here are some of the important ones. According to recent yield and labor statistics,[1] the labor charge against 100 bushels of corn in 4 Southern States [2] is 247 hours as against 46 hours for 100 bushels in 4 Midwestern States.[2] The 13 Southern States usually plant more than 30 million acres in corn. An enormous part of the available human labor is almost wasted on the crop. In the 4 Southern States, it takes 125 hours to produce 100 bushels of sweet potatoes—the equiva-

* Address to 45th Annual Convention of Association of Southern Agricultural Workers, Washington, D. C., February 13, 1948.

[1] From Labor Requirements for Crops and Livestock, USDA, 1943.

[2] Throughout the remainder of this paper, reference to the "4 Southern States" is to Ga., S. C., Ala., and Miss. Reference to the "4 Midwestern States" is to Ohio, Ind., Ill., and Iowa.

lent of about 33 bushels of corn. A ton of peanuts in Georgia and Alabama requires 202 hours of man labor. A bale of cotton requires from about 200 to more than 250 hours of labor, depending on conditions. For the whole flue-cured area, it takes an average of 454 man hours to produce an acre of tobacco. These are the chief cash crops of much of the South. Because of the very high labor charge against such crops, this factor alone accounts in a large part for the low per capita cash income.

Low Production Per Acre

The cost of producing a crop is determined largely by the amount of labor involved and in the yield per acre. The average yield of corn in the 4 Southern States for the 3-year period ending in 1946 was 16 bushels. It was 48.8 bushels in the 4 Midwestern States. Sweet potato yields in the 4 Southern States averaged 92 bushels per acre, cotton 309 pounds, and peanuts 653 pounds (in Georgia and Alabama only), while the yield of tobacco in South Carolina, Georgia, and Alabama averaged 984 pounds. Most of these yields are pitifully low. These low yields of the principal cash crops, coupled with the very heavy labor requirement per acre, are the basic causes of the poor cash per capita income to Southern farm people. Those who do not recognize these basic factors are not in a very good position to effectively serve Southern farmers.

Proof that much higher yields of such crops as corn, peanuts, and potatoes may be obtained can be found in the published results from Southern Experiment Stations and yield demonstrations from Extension Service reports. In the 4 Southern States, the yield of cotton is reasonably good, but it may be considerably increased by known means of soil improvement. Before leaving this subject, one more comparison is made to drive home the importance of yield per acre. In 1946, Iowa produced 135 million bushels more corn on 11 million acres than were made on over 30 million acres of the 13 Southern States. The yield in Iowa was 52.8 bushels, while in Georgia it was only 13.2 (1944-46 average).

Lack of an Adequate Farm Program

The very high labor requirements of the major cash crops in the 4 Southern States have almost prevented the development of an adequate farm program.

A high percentage of the available farm land is not in commercial agriculture. Of the 40.4 million acres of available crop and pasture land in the 4 Southern States, only 8,466,000 acres are in cotton, tobacco, and peanuts. These crops occupy only about 21 per cent of the entire amount of usable land, but approximately 54 per cent of the entire cash income is derived from this small part of the available land. Putting this another way, about 79 per cent of our available land produced only 46 per cent of the cash income of these 4 states in 1946. In my opinion, Southern farmers never will be relatively as prosperous as those of other regions until there is developed a farm program for the commercial use of all this available land. If the 79 per cent of our low-income lands were all made to produce an income like the 21 per cent in cotton, tobacco, and peanuts, the 4 Southern States would not be considered as Economic Problem No. 1.

To develop a farm program for Southern States that will accomplish this purpose, as far as it is possible to do so, should be the general objective of all agricultural agencies serving the South, but the responsibility most properly falls on the State Experiment Stations. With their intimate knowledge of the types of agriculture prevailing in their states, the State Experiment Stations should and must take the responsibility of developing a program that best fits the needs of their respective states. If they do not, who else can? And until we do make good use of the land we have, it seems a little odd for

us to put much stress on population pressure on the land.

Mechanization

Mechanization of the whole farm program in the South is a "must" on the list of things to be done if we are to be able to meet competition in any field. In Georgia the man labor charged to an acre of corn is 37.7 hours, with a yield of 13.5 bushels in 1946. The charge in Iowa is 16.5 hours, with a yield of 60.0 bushels in the same year. Stated more concretely, Iowa farmers have 27.5 hours in 100 bushels of corn, while Georgia farmers have 279 hours in the same amount. If Georgia produced as much per acre as Iowa, the labor charge would still be 63 hours per 100 bushels. It takes an average of only 6.5 hours per acre of wheat for the states of Minnesota, North Dakota, South Dakota, Nebraska, and Kansas.

The preharvest labor charge per acre of cotton in the 4 Southern States is 63 hours, while the harvest charge averages 54 hours. The labor charge against cotton amounts to a bottleneck on all farms that have a considerable portion of the land in cotton. If high yields are made, the demand for labor at harvest time is the chief reason why it will be very difficult to change systems of operation on such cotton farms. But, this very serious bottleneck can be broken if and when effective cotton harvesting and ginning machinery is developed. Likewise, the whole preharvest program must be mechanized as far as it is possible to do so. This means that much research work needs yet to be done on cotton mechanization if the crop is to be produced economically.

In considering this problem, both small and large farms and level and rolling lands must be considered. If we forget the small farmer with his small fields and rolling or hilly land, a large percentage of Southern farm people will find that a mechanization program has made it even harder for them to maintain their present meager economic status. The greatest bottleneck in Southern agriculture will be broken if and when the cotton crop may be harvested by adapted machinery and cleaned and ginned on machines that are much more efficient than anything now available. To help the small farmer, the harvesting machines will have to be relatively inexpensive, such as some of the so-called strippers used in the Southwest. It is sufficient to say that until this is done it will be very difficult to develop a well-rounded program that comprises cotton and at least one other major enterprise to balance it.

Earlier in this paper it was stated that the low farm income of Southern farm people is our great problem. Now we should be in position to understand why Southern farm people have so little. On a per capita basis, we produce too little to sell. Those who fail to understand this are not in a very good position to advise farmers or the State and Federal Legislators who would like to aid farmers by the passage of adequate legislation. Again let me say that the high labor requirement, the low yields of major crops, and the lack of a farm program directed at using a large amount of our available land are the reasons for the low cash income of Southern farmers. These explain in part why farmers in the 4 Southern States had cash sales of cotton and seed amounting to 487, 319, and 504 millions of dollars in 1924, 1934, and 1946, respectively, while farmers of Iowa alone had cash sales of livestock and livestock products of 520, 312, and 1,440 millions of dollars for the same years. Sales of livestock and livestock products in Iowa in 1946 exceeded by 561 million dollar sales of cotton and seed, livestock and products in the 4 Southern States.

It is obvious that cash sales by farmers of the 4 Southern States have not kept pace in recent years with those of farmers of the 4 Midwestern States. Here is one of the chief reasons. The 4 Midwestern States produced 804 million, 531 million, and 1,586 million bushels

of corn in 1924, 1934, and 1946, respectively. In recent years there was an enormous increase in production of their major crop. On the other hand, during the same period the 4 Southern States lost nearly half their cotton acreage. Their total production was 3.9, 3.7, and 3.1 million bales of cotton in the same periods, respectively, even though cotton yields per acre increased from 188 to 303 pounds when comparing the periods of 1924-28 and 1943-47. The increased domestic need for cotton caused by the war and the high price per pound are all that kept the South from experiencing a period of economic crisis at a time when most other agricultural areas were experiencing unprecedented prosperity.

Future of Cotton

Those who face this question realistically have fears as to what is ahead for cotton. The possible competition from other fibers has been presented so many times that it is mentioned only. Then there is the competition from other countries—a factor that cannot be disregarded. Finally, since there are millions of acres in the Cotton Belt that are adapted to cotton production, internal competition may and is likely to become a serious matter to many thousands of farmers who, because of circumstances, cannot produce as economically as fellow Southern cotton farmers who enjoy more favorable production conditions. When normal conditions again prevail, the problems posed here must be met and solved.

All of us who are trying to be realistic about agricultural problems of the South should understand that our area can never be very prosperous as long as cotton is the chief source of cash income. It can occupy only a small part of our available land. The crop now brings to the Southern farmer about 7 cents of the consumers' dollar, while livestock and livestock products take 54 cents of the consumers' dollar. Let's drive this point home another way. If we assume an average production of 12 million bales of cotton over the years and that the crop brings, say, 30 cents per pound, the cash income from lint would amount to 1.8 billions of dollars. This amount of money divided among the large number of farmers in the South would amount to but little per capita; and a crop of such size would pretty well use the reduced labor supply. We would still be more or less frozen to cotton and still the poorest major segment of the American farm population.

Increased Industry and Population Pressure

There is no cause for disagreement with those who stress the great need for more industries in the South. The need for more non-farm employment is generally recognized, but, it is a disservice to the South to lead its citizens to believe that, in the long pull there are many possibilities of reducing very materially the farm population of an agricultural state like Alabama.

In 1944 there were 35,000 more births than deaths in rural Alabama. Let's admit that the birth rate was high in the war years and assume an excess of 20,000 births over deaths in normal times. Now let's remember that in 1940 Alabama's steel industry employed 34,000 persons, textile mills employed 45,000, and sawmills employed 27,000. The total number employed in all manufacturing was 155,000. When we recall how long it took to develop a steel industry employing 34,000 and a textile industry employing 45,000, is it not much more realistic to face the facts in the case and realize the almost total impossibility of developing new industries or bringing in industries from other sections to the extent that population pressure on the land is really reduced?

Those who continue to believe there are great possibilities of increasing industrial employment in the South to the extent that rural population pressure on land may be reduced by this means in normal times should present evidence

to support the viewpoint. This is a very important matter and it is imperative that we do not become the victims of wishful thinking.

Need for Increasing Farm Production

Much of the foregoing discussion has dealt with need for greatly increased production on farm lands in the South. I have tried to show that that is the really fundamental problem facing all farm people—farmers and agricultural workers—if the economic status of farm people is to improve. Before indulging in a discussion of commercial production possibilities, let's first consider the present status. In 1945, the 4 Southern States produced 51 per cent of their own needs for beef and veal, 74 per cent of the pork and lard, 58 per cent of the dairy products, 58 per cent of the eggs, and 93 per cent of the chickens needed, if they consumed the amounts of these products that the average American citizen ate. Nutritionists have stressed the great need for a better fed farm people in the South. The real need for recognition of this problem from a nutritional standpoint alone is emphasized by the high percentage of men rejected by the Selective Service during the war.

The great need for increased production on a commercial scale, however, has not been adequately stressed in reports and recommendations made for the improvement of Southern agriculture. Unfortunately, there are those who have so completely failed to understand the real problems of southern farmers that they think marketing problems overshadow everything else. Sometimes it seems that the research worker is expected to find non-existent markets. There must be outlets for our farm products. But, when a state like Alabama with about 4 per cent of all farm population receives only about 1 per cent of the American farm cash income, is there anyone who will continue to say that marketing is the most important problem?

Throughout the first part of this paper, I have tried to indicate that the South's greatest agricultural problem is one of increased production—a better use of the very large part of its farm lands not in such cash crops as cotton, tobacco, and peanuts. Before this discussion is ended, I think you have a right to expect something concrete and realistic as to the potential possibilities of a vastly increased cash income for Southern farmers. In the effort to do this, I must stop considering the 4 representative Southern States and rely largely on experimental data accumulated by the Alabama Agricultural Experiment Station in recent years.

Some Examples

About 10 years ago, we started a practical farm operation on a 96-acre farm adjoining the Sand Mountain Substation of the Alabama Agricultural Experiment Station system. Supervision was all that this farm received from the Experiment Station. On the farm there was applied the best information that the Station had developed. Cash income came from sales of cotton and hogs—just 2 enterprises. Time limitations prevent giving many details, but the following are the principal points: During the first 3 years, hog sales amounted to $563 and cotton sales $911. These were years of low prices (hogs $6.20 and cotton $9.25) and low corn yields while we were getting the program under way. Cash expenses, except labor, were $1,064 leaving a cash balance of $735 for labor, taxes, insurance, and depreciation. Prices and yields were better during the next three years. Cotton brought in $2,334 and hogs $2,479. There was left $3,601 after paying all cash costs except labor. With still higher prices, but not quite as good yields as in the preceding 3 years, cotton sales amounted to $2,590 and hog sales to $2,673. After deducting cash expenses, except labor, there was a balance of $3,508.

The returns for the one year, 1947, may startle those who have never seen

this farm and who have not already seen something of its potentialities. In that year there were sold 29 bales of cotton from 17 acres and the equivalent of 102 hogs weighing 220 pounds each. Cotton brought in $5,202 and hogs $5,777. Both good yields and high prices account for the very high returns in 1947. After paying all cash costs except labor there was a balance of $8,749. All figures are real. There are no assumptions, no estimates. It is operated by two men, who are supervised by the Station. Any intelligent farmer can do as well on a farm of similar size and quality.

The point to this report is that there are several thousands of farms in the Sand Mountain Region of Alabama that can do the same kind of thing that was done on this farm. Those who are interested in further details will find them summarized in the following table:

and corn, 41 bushels. The average income from cotton and seed has been $902 and from hogs $1,701. After deducting cash costs, except labor, this 32-acre unit has produced per year $2,112 to cover cost of labor, depreciation, taxes, insurance, etc. Please remember that this is a 6-year average and that in 1942 hog prices were about 12 cents and cotton prices about 17 to 18 cents. This is equivalent to a small 2-horse farm with 32 acres in commercial agriculture. One man could handle it well with either a little hired or family help, and he could easily produce his own meat, milk, and vegetables in addition. This moderately good total cash sales can be explained only on the basis of pretty good production from each acre devoted to the commercial enterprise and to fairly good prices during the 6-year period.

Now, let me close this part of my

CASH RECEIPTS, CASH EXPENSES, AND CASH BALANCES BY PERIODS OF A 96-ACRE PRODUCTION MANAGEMENT UNIT, SAND MOUNTAIN SUBSTATION, CROSSVILLE, ALA., 1938-47

Item	1938–40	1941–43	1944–46	1947
Cotton and Seed Sales	$911.00	2,334.00	2,590.00	5,201.74
Hog Sales	563.00	2,479.00	2,673.00	5,576.67
AAA. Eggs, Etc.	325.00	332.00	227.00	503.73
Total	1,799.00	5,145.00	5,490.00	11,282.14
Cash Expenses	1,064.00	1,544.00	1,982.00	2,532.78
Cash Bal. for Labor, Taxes, etc.	735.00	3,601.00	3,508.00	8,749.36
Average price Cotton	9.25	19.07	25.13	32.71
Average price Hogs	6.20	11.91	15.02	24.85
Corn fed to Hogs—bushels	791	1,472	1,182	*1,387

* Includes 233 bushels grain sorghum.

On another production unit of the Alabama Agricultural Experiment Station system, 32.2 acres are devoted to a cotton-hog production program. There are 7 acres in cotton, 7 in peanuts, 12 in corn, and 6.2 in pasture and kudzu. The unit is not handled as an independent farm such as the one just described, but the results are just as illuminating. Six-year (1942-47) average yields are as follows: Cotton, 471 pounds (a light bale per acre); peanuts, 1,676 pounds; paper by presenting the results from a milk production unit at the Gulf Coast Substation of the Alabama Agricultural Experiment Station system. In this particular unit, the object is to produce milk in volume and at the lowest possible cost. There are 57 acres of improved pasture, 11 acres of corn, 5 acres of alfalfa, and 12 acres of kudzu involved in the production system of this unit. In the calendar year of 1947, ap-

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Courtesy, Dept. of Public Relations, Ontario Agricultural College

Fig. 1. Drainage ditches are important on muck lands as aids in keeping the water table at desired levels.

A 5,000-Acre Water Garden?

By C. C. Filman, J. H. L. Truscott, and R. Goodwin-Wilson

Department of Horticulture, Ontario Agricultural College, Guelph, Ontario

ABOUT 5,000 acres of organic soils, known as the Holland-Bradford marshes, are situated 35 miles north of Toronto, Canada. The area is drained by a system of ditches leading to pumps which expel surplus water into a river. There is considerable variation in the age, origin, and depth of the soils when one field is compared with another. Some fields have been cropped for 30 years and some bore a first crop in 1947. Celery, lettuce, carrots, potatoes, and onions are the principal crops.

Previous attempts to discover the fertilizers needed in the soils, by methods (rapid colourimetric determinations) used for mineral soils, were not successful in that the analyses were not reflected by the condition of the growing plants. It was evident that the average marsh soils contained very little mineral soil, and that the organic materials themselves might often be regarded as an inert medium for the physical support of the plants. Moreover, it was known that the leaching effects of heavy rainfall was great in comparison with such effects in average mineral soils. Consequently it was decided, as a working hypothesis in 1947, to regard the marshes as a water garden.

Studies made in 1947 were designed to explore the water garden supposition. Their results appear to confirm

TABLE 1.—ANALYSES IN P.P.M. OF LIQUID FROM SUCCESSIVE PRESSINGS OF TWO SOIL TYPES

	N	P	K	S.C.
Soil of Intermediate Age (8–10 years)				
Extraction #1	200	9	35	500
" #2	200	10	45	500
" #3	200	8	30	500
" #4	200	6	50	550
New Soil (2 years)				
Extraction #1	15	4	45	130
" #2	20	4	30	140
" #3	20	4	35	140
" #4	20	4	30	140

the hypothesis sufficiently to warrant further study.

Solute Samples

We assume that the soil was not important in the nutrition of the crop and that the crop was feeding largely from solutes in the top 8 to 12 inches of the soil. Soil samples were pressed and the extracted liquid was analyzed by quick colourimetric procedures for nitrogen, phosphorus, and potassium. An evaluation of total salts was obtained by measuring specific conductance (S.C.) with a "Solu-Bridge Soil Tester." Analyses were made on selected fields before the spring application of fertilizers and at about fortnightly intervals thereafter.

Tests indicated that successive pressings of one sample of soil yielded fluids of approximately similar composition (Table 1). Thus there was no need of special care in regulating the pressures used to extract a sample of soil.

No special difficulty was encountered in obtaining sufficient fluid, for testing purposes, from the amount of soil necessary to fill the press.

Analyses of Solutes

Analyses of fluids removed from the upper 8 to 12 inches of soil representing fields cropped during 15 to 20 years, 8 to 12 years, and 1 to 2 years, respectively, are shown in Table 2. The Table contains data concerning a single crop.

Movement of Solutes

The effect of heavy rainfall is not shown in the Tables. However, solutes expressed before and after heavy rains showed marked leaching effects as a result of heavy rainfall. The possible fates of leached solutes are of interest. In most instances the soils retained sufficient nutrients to produce crops rated fair to good. It would seem that vertical movement of solutes compensated for leaching after rains in those instances.

There was one striking instance (onions, Grower 9) where the phosphorus content of the extracted solute was never greater than 1 p.p.m. It would appear that the plants must have had access to supplies of phosphorus in soil levels below that sampled.

There were other examples of the importance of solutes in soil horizons lower than those sampled. For instance, the solutes in the upper 12 inches probably increased greatly in three fields in a newly developed area. The

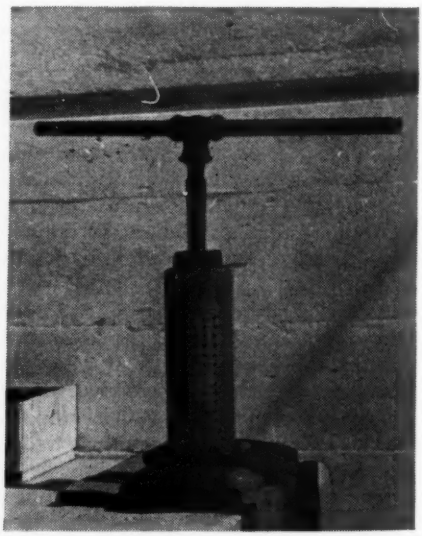

Fig. 2. Press used to extract solutes from organic soil.

TABLE 2.—EARLY LETTUCE. SOIL ANALYSES AND CROP RATINGS

Grower	Nitrogen		Phosphorus		Potassium		S. C.	Crop Estimate
	Av.	Range	Av.	Range	Av.	Range	Av.	
Old Soil (15–20 years)								
(1)	68	15–100	12	6–16	45	35–60	307	Good
(2)	62	20–100	16	15–16	57	30–100	316	Fair
(3)	78	20–100	9	2–16	47	30–100	406	Poor
Intermediate Soil (8–12 years)								
(4)	64	20–150	14	6–16	58	38–100	322	Good
(5)	149	40–200	15	6–16	196	45–500	486	Poor
(6)	74	20–150	10	4–16	68	40–100	311	Good
New Soil (1–2 years)								
(7)	16	T–50	7	T–16	52	20–100	216	Good
(8)	47	15–120	15	3–16	63	30–100	253	Fair
ONIONS. SOIL ANALYSES AND CROP RATINGS								
Old Soil (15–20 years)								
(9)	31	T–75	1	T–1	60	25–100	290	Fair
Intermediate Soil (8–12 years)								
(10)	27	2–100	14	4–16	47	30–100	222	Poor
New Soil (1–2 years)								
(8)	38	6–130	12	0–16	54	20–100	228	Good
POTATOES. SOIL ANALYSES AND CROP RATINGS								
Old Soil (15–20 years)								
(9)	25	T–60	2	0–14	35	12–80	200	Fair
Intermediate Soil (8–12 years)								
(10)	40	T–150	16	6–16	51	25–100	279	Good
New Soil (1–2 years)								
(7)	36	0–70	6	1–16	30	18–50	170	Fair

fields received no fertilizer and they produced a satisfactory early crop of lettuce. The soil in these fields was examined in October, only, and it was found to contain a concentration of soluble salts that, in all probability, would be toxic to any common vegetable. The fields in question were on the low side of the natural drainage slope. It is possible that solutes moved in from higher areas and were concentrated as a result of evaporation.

The solute concentration in two old fields increased markedly as the season advanced and after the early crop of lettuce was removed. In one instance the solutes may have come from lower horizons since the soil was deep. It is possible, however, that water moved in through an earthen dyke on the high side of the field and that the solutes were concentrated as a result of evaporation. The second field had shallow soil and therefore there was little chance of the solutes coming from lower levels. Natural drainage from a considerable uncropped area could have been the source of the solutes.

Enough evidence came from the one-season study to indicate that the lower horizons of organic materials are of great potential interest both as sources of nutrients for a growing crop and as an avenue of movement of solutes from one part of an area to another.

Analyses of Drainage Pump Water

Water discharged by the principal pumping station was sampled during part of the season (Table 3). Nearly all of the water came from the area of marsh in which the investigated fields were situated. The data in Table 3 show that an average of approximately 4 p.p.m. of potassium and rather large amounts of total salts were present in the water pumped from the marshes. Approximate figures were available on the amount of water going through the pumps. Calculations showed that approximately 88,000 lbs. of potassium and 44,000 tons of miscellaneous solutes were pumped from the marshes into a neighbouring river — a considerable "erosion." The composition of the miscellaneous solutes is not known but both phosphorus and nitrogen could be present in combinations not affected by the method of analysis used for those two elements.

The high solute content and the important quantities of potassium in the drainage water are further indication that solutes move freely through and from the marshes.

TABLE 3.—DRAINAGE PUMP WATER: P.P.M. OF N.P.K.

Date	N	P	K	S.C.
April 22	T	.....	5	65
April 30	.....	.....	3	55
May 5	.....	T	.....	55
May 15	.....	.....	3	60
May 27	T	.....	5	62
June 19	T	.....	5	63
July 4	.....	.....	.....	55

Solute Composition and Plant Response

The work is not sufficiently advanced to suggest that fertilizer application should be based on analyses of solutes pressed from the upper soil levels. But, for the first time so far as these marshes are concerned, a quick analytical procedure showed amounts of nitrogen, phosphorus, and potassium which bore some relationship to the condition of plants growing in the marshes. Moreover, the quantities of the three elements were roughly similar to those used in liquid culture of several kinds of plants. When the crop rating (Table 2) was less than good it was usually, but not always, possible to relate tentatively the condition to either a nutrition factor, poor local drainage, or an extreme change in weather.

Summary

1. Solutes expressed by pressure from the organic soils studied appeared to represent the nutrients available to the

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Hybrid corn makes its greatest gain in total growth after the appearance of tassels and shoots. During this time the crop draws from the soil the largest amounts of its supply of nitrogen, phosphorus, and potassium.

Needs of the Corn Crop

By H. J. Snider

Agricultural Experiment Station, University of Illinois, Urbana, Illinois

CORN is grown over a wide area in the United States, yet the main production of this grain is restricted to a relatively small belt of land known as the American Corn Belt. This belt of corn land is a continuous and unbroken area of almost ideal farm land and comprises somewhat less than 10% of the total land area of the United States.

The climate of the corn belt is never used in any publicity campaigns to attract or hold folks to this area. A man recently returned from a state where climate figures largely in regional publicity said that at least folks in the Midwest were honest in their comments regarding their weather conditions.

It is not uncommon for a corn crop in the corn belt at the start of its growth to shiver through many chilly days and occasionally be covered by snow or pelted by sleet. Later in the season it may swelter through many sultry days. It may be withered by drouth, lashed by storms, riddled by hail, and finally ere it is mature may again be chilled and perhaps killed by freezing temperature. With such a climate, or in spite of it, this relatively small area of farm land has been referred to as the breadbasket of America, and at times may serve as such to some of the other continents of the world.

Whatever we may say about our corn-belt climate, corn needs long days of sunshine. Scientifically speaking,

the corn plant has the capacity to absorb large amounts of radiant energy. This energy, or sunlight, converts carbon dioxide and water into complex organic compounds which finally make up our basic food supply of proteins, carbohydrates, oils, vitamins, and minerals. Corn is adapted to sunlight and will not flourish in shade. In fact it must not be too thickly planted on the ground else it will suffer from its own shade.

It is not apparent that corn needs extremely hot weather for its highest production. It usually grows through many hot days and warm nights and apparently tolerates them. There are on record seasons in which high temperatures did not prevail during July and August and yet the production of corn was high.

It is apparent that corn needs a liberal supply of moisture. There is nothing quite so disastrous to the corn crop as a prolonged drouth during its reproductive growth stage in July and August. Improving corn-belt soils so that they may supply more moisture during this critical period is a problem worthy of the best practical and scientific talent.

Corn must have a fertile soil along with the lengthy summer days and liberal supply of moisture. This fertility must be in soils in large quantities and somewhat balanced in amounts. The corn plant does not require an exceptionally fine balance in this respect as it has rather highly developed selective powers.

Nutritive Elements

There is, on the other hand, considerable selectivity on the part of important nutritive elements in soils. Some of the more important elements are among the more chemically active and due to this greater activity these elements enter the corn plant to the exclusion of the less active and less desirable. This is illustrated by the relationship between the elements potassium and calcium. Almost all corn-belt soils are abundantly supplied with available calcium while a large portion are in short supply of potassium. It is not unusual to find upward of 5,000 pounds of available calcium in the topsoil of an acre and 200 pounds or less of available potassium. When the composition of corn grown on these soils is determined, it is usually found to contain approximately 100 pounds of potassium and only about 30 pounds of calcium in the grain, stalks, and cobs of a 100-bushel crop.

It may also be observed from this composition data that several other important nutritive elements bear a similar relation as does calcium to the more chemically active element potassium. Among these other elements are magnesium, iron, and manganese.

Time of Heaviest Feeding

Nitrogen is one of the more active elements in soils, and it may violate just a little the rule of going into the corn root considerably out of proportion to the amount available in the soil. In some tests made on the Morrow field plots at Urbana, 160 pounds of available nitrogen (nitrogen as nitrate) were found in the soil in early July. When the corn was mature, the crop (grain, stalks, cobs) contained 189 pounds of nitrogen. Another similar test on the same series of plots revealed that there were 100 pounds of available nitrogen in the soil when the corn began its heavy growth early in July. The corn crop when mature contained 123 pounds of this element. These tests were made when soil conditions were very favorable and it is not likely that all results along this line would coincide as closely as these. This does, however, indicate that nitrogen may be taken up by the corn crop in somewhat near the amounts available in soils.

The corn crop needs and takes from the soil the largest amounts of fertility elements at the time it is making the greatest increase in total growth. The time of greatest increase is after the tassels and ear shoots begin to appear.

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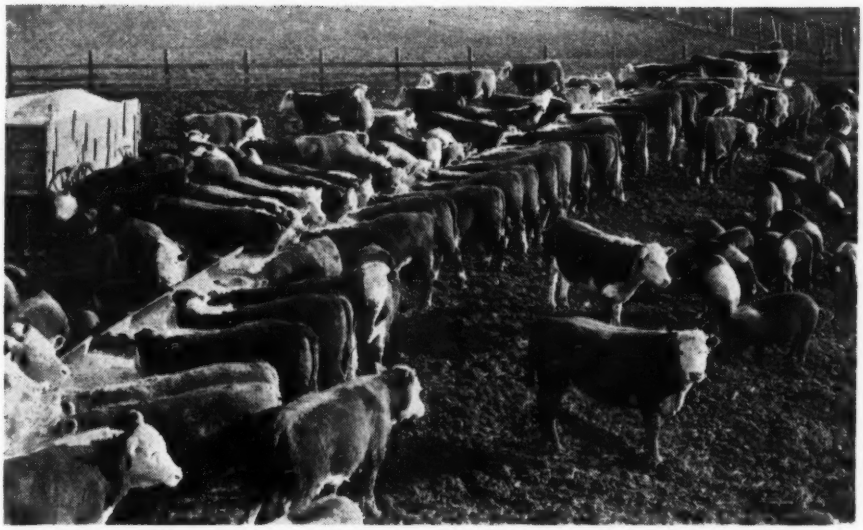

Fig. 1. Organic matter being converted to meat. Soil conservation is easy with livestock farming.

Organic Matter and Our Food Supply

By George D. Scarseth

American Farm Research Association, Lafayette, Indiana

A FEW extra hard rains and the resulting floods are front page news of importance. A few weeks without any rain and the headlines cry —DROUTH THREATENS FOOD SUPPLIES. Crop reporters lower their estimates. Grain speculators take notice and prices soar. The crops show nitrogen starvation symptoms, and farmers grumble about the shortage of nitrogen fertilizers. Our Nation's President pleads for meatless and eggless days.

This all seems so confusing and a bit terrifying to John Q. Citizen whose food is the center of the issue. Most likely we blame the weather, and more or less dismiss the idea that there might be a basic cause behind this great problem that we can do something about. It gives one a feeling of being presumptuous to venture an analysis of the basic cause of this state of affairs. However, to discover the core of the trouble is to take the first steps in correcting the difficulty.

The agronomists and soil scientists know that the basic cause of our food shortage is the low and declining content of organic matter in our soils.

A well-fed people eat lots of protein foods—meat, milk, eggs, and cheese. Protein foods largely disappear from the diet of poorly fed people, and they must manage on cereals—largely energy

foods that contain chiefly carbon, hydrogen, and oxygen and very small quantities of tissue- and bone-building substances. We read how millions of people are on diets too low in calories (2,000 calories or less) to supply them with adequate energy for living. Little wonder they aren't productive workers. The energy foods are only human gasoline, and the malnutrition of such people must be terrific even if direct death does not result.

Protein foods are nitrogen-carrying foods. Every farmer knows that nitrogen and soil organic matter are closely related. Every farmer knows that a soil high in organic matter is also a very productive soil. Every farmer knows that legumes like clover, alfalfa, and sweet clover add valuable organic matter to the soil. The farmers also know that the organic matter from these legumes is better than the organic matter from non-legumes, because clover makes nitrogen into chemical compounds out of the free nitrogen in the air.

Any close observer traveling through the Corn Belt this last season frequently observed the paradox where on one side of the road the corn crop was almost a failure because of early wet weather and late summer drouth, while on the opposite side of the road there would be a corn field that was producing abundantly and apparently not adversely affected by the so-called bad season. No one saw this more accurately than my friend George Hoffer of hybrid corn and potash fame. He pointed out this fact to different people making field trips throughout the Midwest with him this summer. The few who saw it always were impressed, but this fact needs to be more deeply imprinted in the minds of everyone who finds himself in the midst of abundance on one hand and famine somewhere else.

This is not a new story because keen observers through the years have seen it. In about 1750 Jared Eliot, a country minister, doctor, and farmer from Killingsworth, Connecticut, said in a letter: "I have observed when I was in y back parts of y Country about 20 years past when y woods was not pastured & full of high weeds & y ground light, then y rain sunk much more into y earth and did not wash & tear up y surface (as now)."

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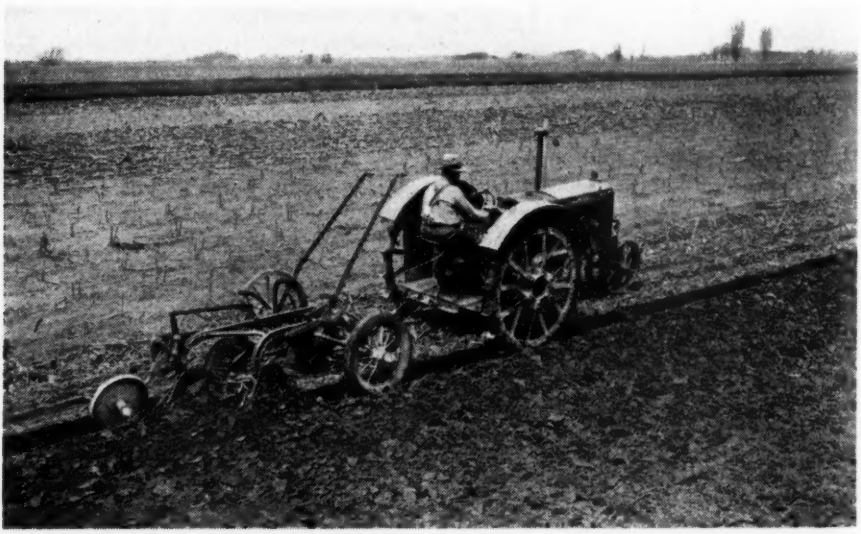

Fig. 2. Soil mining. Almost no organic matter is turned under, and the farmer is risking his future.

Winter Grazing Increases Southern Livestock Profits

By H. B. Vanderford

Mississippi State College, State College, Mississippi

BY taking advantage of recent research information along with that obtained from demonstrations and the experience of farmers, many operators throughout Mississippi are now growing nutritious forage during the winter months and marketing good beef cattle in the spring as well as in the fall. This reality has now come to pass and you can hear this story all over the State and throughout the Southeast.

The production of forage crops during the winter months of the year is usually less hazardous from a moisture standpoint than it is during the summer months when long dry periods are often encountered. Instead of concentrating so heavily on the saving and storing of forage, many farmers throughout the State are now thinking in terms of planting small grains and clovers, or other legumes, in the early fall and letting the cattle do the harvesting. This is a more economical method, little labor is involved, and the land is usually well protected from the ravages of soil erosion.

Figure 1 shows some beef cattle on a field growing oats and crimson clover. This photograph was taken on December 16. The animals remained on this field all winter, without a shed, and gained approximately 300 pounds of beef per acre. At the same time, the soil was well protected from the impact of beating rain drops and soil erosion. The production of winter-grazing crops offers the same advantage to the dairy farmer as it does for the farmer engaged in the production of beef cattle.

Mississippi cannot boast of the large acreage of highly fertile soils as some other states in the country, but nevertheless the commonwealth is still well blessed in terms of fertility and soil resources. The excellent physical properties of the soils and the prevailing mild climate of Mississippi together make an evironment which is very favorable for grazing livestock during the winter months. This gives us a decided advantage even though the soils in many localities are low in natural fertility. Soil fertility can usually be bought by way of commercial fertilizers, but favorable climate is never for sale on the market.

Types of Soil

The different soil materials deposited in Mississippi and other southern states by various agencies and the action of the forces of nature over a long period of time have given rise to many types of soils. Under the predominating climatic conditions, all of the soils tend to be low in nitrogen, which is a very important plant nutrient. Many of the soils are also deficient in exchangeable potash, calcium, and available phosphorus. In spite of these chemical deficiencies, however, soils with favorable physical properties and suitable for the production of winter-grazing crops, when sufficient minerals and fertilizers have been applied, are found in every section of the State.

Many of the soils which have been low producers of ordinary row crops because of fertility, slopes, or some other

Fig. 1. Poor land produces an abundance of high quality feed and fat cattle in January when properly fertilized. Scenes like this in the winter indicate the opportunities available in agriculture throughout the Southeast.

factor, can and now are being utilized for the production of winter forage crops. Many of the fields comprised of soils low in fertility which in the past produced low net returns under a row crop system of farming are now producing nutritious forage that is being used for the production of beef and milk. These desirable physical characteristics of the soils are valuable, and after the necessary minerals have been supplied, the soils are capable of producing an income during the winter by way of beef and dairy cattle. This offers the farmers of Mississippi an opportunity to properly utilize every acre of land on the farm, which increases the farm income and usually gives the land good protection from soil erosion.

Favorable Climatic Conditions

The geographic location of the State of Mississippi places it under a mild humid climate which enables livestock to stay outside the year round without suffering from exposure. The average mean temperature for the past 50 years has been approximately 65 degrees. The mildness of the temperature is usually accompanied by a frost-free growing season of about 200 days. In addition to the pleasant temperature there is also an abundance of rainfall which is usually more uniformly distributed during the winter than it is in the summer. The average annual precipitation for the State as a whole is approximately 55 inches, mostly in the form of rain. Under this mild climate the farmers from the Tennessee line to the Gulf of Mexico can usually keep beef cattle on grazing plots or pastures all winter with little or no protection.

Under these conditions the overhead is reduced along with all the costs involved in the production of beef and milk. Dry periods quite often occur in the summer and plant growth is curtailed because of a moisture deficiency in the soil. In the winter, however, soil moisture is usually abundant. This fact alone has pointed toward more crop production in the winter because favorable growing conditions are usually certain if good stands are obtained in the early fall.

Green Pastures in Winter

Among the many acres that have always been brown and dry during De-

cember and the following winter months, many Mississippi farmers now point out with pride a number of fields and pastures that have changed from brown to a beautiful green. This has come about because the farmers have been progressive and have taken advantage of recent research data released by the Mississippi Experiment Station and relayed to the farmers by publications and the Extension Service.

Figures 3 and 4 show some land that had previously been idle for a number of years growing in January a good crop of oats which is high quality feed. This land was prepared, fertilized with adequate amounts of nitrogen, potash, and phosphate, and seeded with three bushels of oats in early September. The animals grazing on it were fat and did not have to keep busy looking for food. Not far from this scene on similar soil a farmer was using a different method for wintering his cattle. This method is shown in Figure 5. The animals seen in the picture are in a pasture, but they are eating baled hay. Harvested and stored feed had to be given to these animals to carry them through the winter. Under these conditions no gain in weight can be expected and a decided loss is usually obtained, as well as loss of animals occasionally from nutritional diseases and parasites. A part of the pasture shown in Figure 5 could be made to look like the pasture shown in Figure 3 with proper preparation, soil treatment, and seeding. A few acres of good winter-grazing crops might enable the farmer represented by Figure 5 to sell some hay and also produce fat cattle in the winter.

Soil Fertility and Management Necessary

The controlling factors in the success of any agricultural program, more especially a livestock program, are soil fertility and management. Since food is a product of the soil and man's actions are governed somewhat by his food supply, we quite often hear the statement that soil fertility governs the health and happiness of the human race. Hungry people do not have the time or desire to develop great nations. Great civilizations rise only when man does not have to spend much of his time looking and working for food. Although man is bound to the surface of the earth and the soil, the domestic animal is bound even more securely and is more limited in his range of feeding. The animal is bound by barriers to certain acres of land and must depend on the soil to provide the essential nutrient elements necessary for proper growth and reproduction.

The first requirement in the production of winter-grazing crops is to provide the fertility needed in order that the soil can deliver into the forage the essential nutrients that the animal needs. Not only do we need bulk and tonnage, but quality as well. Figure 6 indicates the need for balancing the fertility in some soils. The plot in the foreground of the photograph received nitrogen alone and consequently the growth of the forage was limited. The plot on which the man is standing was treated with potash, phosphate, and lime in addition to the nitrogen. A complete fertilizer certainly told the story that a balanced fertility was needed in this soil. Many observations on the farms over the State have pointed to the same conclusion. When the fertility of the soil was satisfactory and adequate, either natural or applied, good winter grazing has been obtained; but where little attention has been given to this important factor, failures often have resulted.

In addition to proper fertility, winter-grazing crops must be managed and protected in somewhat the same manner as other crops. These forage crops must be protected until sufficient growth has been made to justify grazing. Then the common pasture sin of overgrazing must be avoided. Too many animals per acre will ruin the best winter-grazing crop in the world. The number of animals an acre of forage will

TABLE 1.—RESULTS OF WINTER-GRAZING CROPS UTILIZED FOR THE PRODUCTION OF BEEF *

	Plots and Crops		
	1 Oats	2 Oats and Winter Wild Peas	3 Oats and Crimson Clover
No. acres per plot	9.4	9.4	9.4
No. animals per plot	11	11	11
No. days on plots	166	166	166
Average daily gain on plots	1.36	1.50	1.38
Total gains per acre	256	291	269
Total value of crop per acre	$61.88	$66.79	$63.07
Total crop cost per acre	$17.19	$19.33	$21.43
Net value per acre	$44.69	$47.46	$41.64

* Mississippi Farm Research, October 1947, State College, Mississippi.

support depends on the fertility of the soil, the weather, and the management the plots receive.

Returns Per Acre

Any agricultural practice must be sound, feasible, and economical before the farmers in general can apply it on their farms. Two questions are always naturally asked: What will it cost, and how much will it mean in terms of added farm income? In Table 1 are some data collected from three winter-grazing crops planted on relatively poor land, but well fertilized, during the winter of 1946-1947. The crops used were oats, oats and wild winter peas, and oats and crimson clover combinations. The plots were 9.4 acres in size and 11 beef-type calves, weighing approximately 420 pounds each, were placed on each plot the first of December. The animals grazed the crops without any other food or shelter for 166 days. The total gain in pounds of beef per acre ranged from 256 for the oat plot to 291 for the oats and wild winter pea combination. This gave a total cash return of slightly more than $60 per acre. The costs involved in producing the crops were rather high also, but when these values are subtracted from the total returns, a net return of more than $40 per acre is obtained. This actually represents cash return from the use of land from December through May or during the winter and spring months. By this method the grazing crops were utilized completely for grazing. It is well to point out that that farmer has at his election the choice of either grazing the winter forage crops until June or removing the cattle the first of March in order to produce a grain or seed crop.

Table 2 contains some data collected from South Mississippi on poor sandy soils where two lots of beef steers were compared; one group being fed in a dry lot and the other grazed oats and crimson clover that had been well fertilized. The test period ran from November 6 to May 20. It can be seen from these data that letting the animals harvest their own feed was superior to feeding in a dry lot crops or crop product that someone else had harvested. Steers on the winter-grazing crops, without additional feed made an average daily gain of 1.14 pounds while the steers fed ample ration in the dry lot gained only 0.8 pounds per day. According to calculations the winter-grazing crop here was worth $18.76 per acre in terms of the beef that was produced. This is a nice cash return from the use of poor sandy and leached soil during a period when it is not always used.

(*Turn to page* 40)

Fig. 2. Many pastures and fields now change from brown and dead grass to a panorama of green in October and cattle find choice feed from November through the winter months.

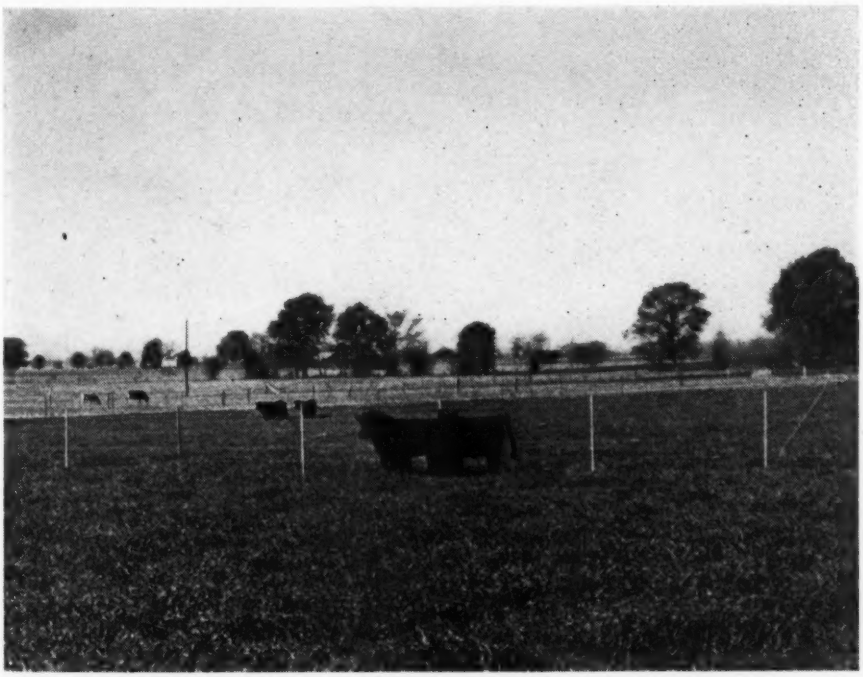

Fig. 3. Cattle knee-deep in green oats the first of January. In background, dairy cows look for something to eat in a dry pasture. The field in foreground was treated with nitrogen, potash, and phosphate and seeded in September.

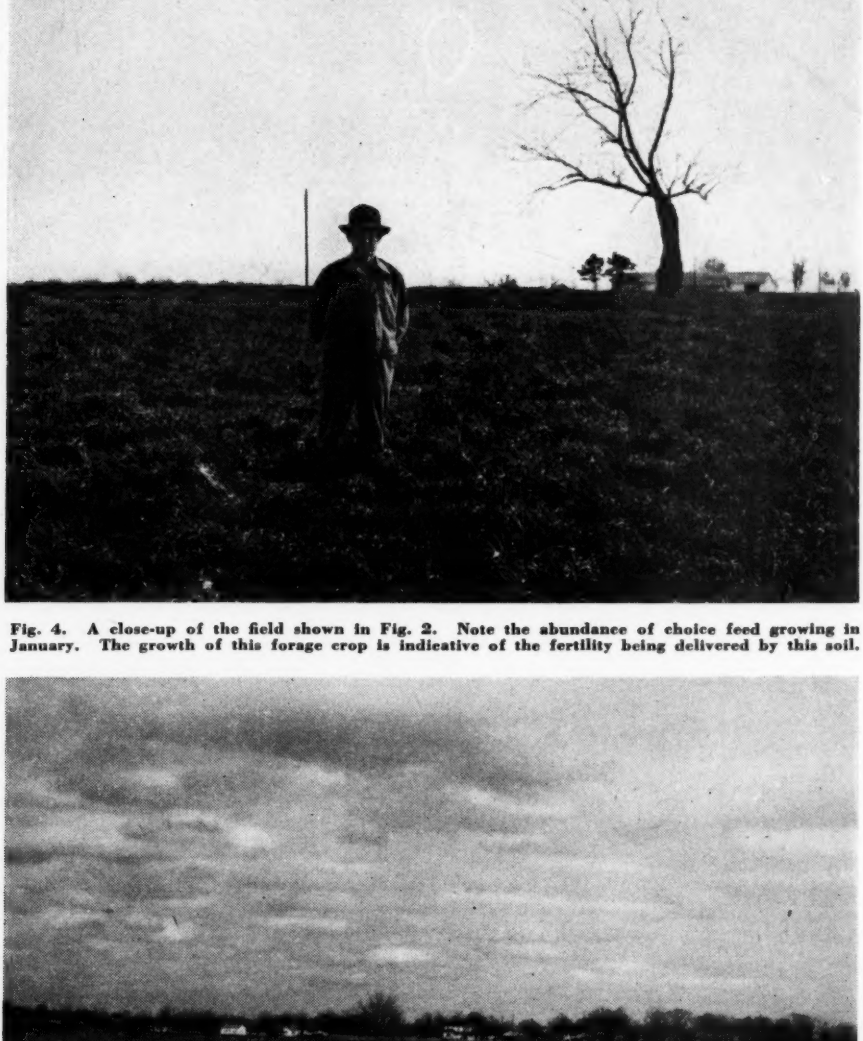

Fig. 4. A close-up of the field shown in Fig. 2. Note the abundance of choice feed growing in January. The growth of this forage crop is indicative of the fertility being delivered by this soil.

Fig. 5. Poor cattle in a dry pasture eating hay. This scene was near the field shown in Figs. 3 and 4 and was photographed the same day. Cattle are carried through the winter by this method, but gain no weight.

Fig. 6. A complete fertilizer produces more and better oats. The plot on which the man is standing was treated with potash, phosphate, and lime in addition to nitrogen. Nitrogen alone was used on the plot in front of the man.

Fig. 7. Winter-grazing crops produce beef cattle for the spring market in South Mississippi on sandy coastal plain soils properly fertilized. Beef cattle produced in this manner provide a good source of income.

Fig. 8. Winter grazing enables the farmer to market livestock in the spring as well as the fall.

Fig. 9. Sudan grass makes rapid growth and serves as an excellent supplemental grazing crop for beef and dairy cattle. Supplemental crops like this enable the farmer to give the permanent pastures some relief during the dry summer months.

The Editors Talk

The Cost of Producing a Bushel of Corn

That high yields per acre lower unit costs is almost axiomatic. However, new evidence is always of interest in the constant struggle to get and keep American agriculture on a sound financial basis. A report on regional and national studies in field corn production costs in 1946 made by the Bureau of Agricultural Economics of the U. S. Department of Agriculture, therefore, is welcome, since corn is the crop most widely grown in this country.

A net cost of 54 cents per bushel, based on 1946 yields and excluding rental charges, was the lowest figure reported in these studies. It was accorded the Iowa-Illinois area and represented the approximate price that farmers would have to realize in order to cover production expenses, allowances for upkeep of equipment and buildings, and going rates for labor. In all of the regions it was noted that farmers made more use of labor-saving machinery for crop production in 1946 than in any previous year and that the per-acre yield of major crops was favorable.

The net cost of production of corn per acre, including rent, was estimated at $38.03 for the nation; $41.26 for the Iowa-Illinois area; a high of $47.35 for the Northeast region; and a low of $29.14 for the Southwest. On a net bushel cost basis, with rent included, the Iowa-Illinois area cost was 72 cents; the Southwest, $1.66; the Southeast, the high of $2.02; while the national average was $1.03. Without rental charges, the national average cost per acre was $30.38 and the per-bushel cost, 82 cents.

Main cost factors per acre for corn in order of importance on a national basis were: land preparation and planting, $7.83; land rent, $7.65; harvesting, $7.27; cultivation, $5.37; overhead and miscellaneous, $4.69; hauling to market, $2.92; manure and fertilizer, $2.85; and cost of seed, $1.35.

It is conceivable that the Iowa-Illinois area, being in the heart of the nation's corn belt and with its rapidly increasing understanding and use of proper fertilizers, will retain its relationship in such a survey of corn production cost figures. It also is conceivable that before too many more years have passed into our agricultural history there will be some shifts in the relationships now held by other regions.

Notable in this assumption is the Southeast where already some record per-acre yields of corn are being obtained. The South is just beginning to learn that it can grow good corn. With a long growing season, plenty of moisture, and increased use of mechanization, adapted hybrids, and fertilizers, Southern farmers are looking to more corn per acre to aid in the much-needed diversification in their sources of income. Too often in the past, yields of 12-15 bushels per acre were the rule while now 75-100 bushels are not at all uncommon and state averages are approaching the very respectable figure of 40 bushels per acre. Southern

farmers also are learning the secrets of growing good pastures for year-round grazing. Good corn, in addition, will favor a livestock industry which coupled with cotton and other regional cash grops will mean economic freedom for many a Southern operator.

On the editorial pages of the February issue of this magazine, we commented on the annual convention of the Association of Southern Agricultural Workers and in particular on the address of Dean Funchess of Alabama, President of the Association. The interest in his analysis of the South's agricultural problems has been so great that in this issue we are presenting the full text of the address. In it will be found further discussion of comparative corn production costs and some of the reasons for the figures resulting from the survey made by the Bureau of Agricultural Economics. They deserve careful thought in any approximation of our nation's potential resources.

Applying Fertilizers

Since commercial fertilizer first became available to the American farmer, the crying need has been for information on what fertilizer, the amount, and how to apply it for the most efficient use by farm crops. With fertilizer use predating official research by a quarter of a century, the only basis at first was trial and error. Upon the establishment of Agricultural Experiment Stations, first consideration was given to fertilizer studies. This early research, valuable as it was in stressing the importance of the use of plant food, gave little or no consideration to the method of application.

It was not until 1925 that in the course of an address at the first annual convention of the National Fertilizer Association at White Sulphur Springs, West Virginia, Dr. Jacob G. Lipman, Director of the New Jersey Experiment Station, pointed to the necessity of making a careful study of the various methods of applying fertilizer and the machinery used for distribution. He suggested the formation of a joint committee of agronomists, agricultural engineers, and representatives of the fertilizer industry to undertake the study.

In accordance with this suggestion, the National Fertilizer Association promptly appointed three of its members to serve on the committee. Dr. Lipman's ideas were conveyed to the American Society of Agronomy, the American Society of Agricultural Engineers, and the National Association of Farm Equipment Manufacturers, and each of these organizations named representatives to serve on the committee. Thus, from this humble beginning, the National Joint Committee on Fertilizer Application, which now also includes the American Society for Horticultural Science and the National Canners Association, went into action. In the twenty-three years it has functioned there has developed a fertilizer consciousness and fuller knowledge of the factors favoring fertilizer utilization than likely could have come to pass without joint action of the type that has characterized this activity. From skepticism as to fertilizer values to recognition of their maximum potentialities, from haphazard methods of application to precision application, the progress made is reflected in present-day practices.

The significant contribution this joint activity has made to date in promoting greater efficiency in fertilizer use is a matter of record. The committee's purpose now as in the beginning is to stimulate, encourage, and initiate, wherever there is interest, experimental work with fertilizers. By consideration of problems, plans, procedures, and finally publicity on results, the influence of the National Joint Committtee on Fertilizer Application is destined to render an even greater service.

Season Average Prices Received by Farmers for Specified Commodities *

Crop Year	Cotton Cents per lb.	Tobacco Cents per lb.	Potatoes Cents per bu.	Sweet Potatoes Cents per bu.	Corn Cents per bu.	Wheat Cents per bu.	Hay Dollars per ton	Cottonseed Dollars per ton	Truck Crops
	Aug.-July	.....	July-June	July-June	Oct.-Sept.	July-June	July-June	July-June	....
Av. Aug. 1909–July 1914....	12.4	10.0	69.7	87.8	64.2	88.4	11.87	22.55	....
1923.....	28.7	19.0	92.5	120.6	82.5	92.6	13.08	41.23	....
1924.....	22.9	19.0	68.6	149.6	106.3	124.7	12.66	33.25	....
1925.....	19.6	16.8	170.5	165.1	69.9	143.7	12.77	31.59	....
1926.....	12.5	17.9	131.4	117.4	74.5	121.7	13.24	22.04	....
1927.....	20.2	20.7	101.9	109.0	85.0	119.0	10.29	34.83	....
1928.....	18.0	20.0	53.2	118.0	84.0	99.8	11.22	34.17	....
1929.....	16.8	18.3	131.6	117.1	79.9	103.6	10.90	30.92	....
1930.....	9.5	12.8	91.2	108.1	59.8	67.1	11.06	22.04	....
1931.....	5.7	8.2	46.0	72.6	32.0	39.0	8.69	8.97	....
1932.....	6.5	10.5	38.0	54.2	31.9	38.2	6.20	10.33	....
1933.....	10.2	13.0	82.4	69.4	52.2	74.4	8.09	12.88	....
1934.....	12.4	21.3	44.6	79.8	81.5	84.8	13.20	33.00	....
1935.....	11.1	18.4	59.3	70.3	65.5	83.2	7.52	30.54	....
1936.....	12.4	23.6	114.2	92.9	104.4	102.5	11.20	33.36	....
1937.....	8.4	20.4	52.9	82.0	51.8	96.2	8.74	19.51	....
1938.....	8.6	19.6	55.7	73.0	48.6	56.2	6.78	21.79	....
1939.....	9.1	15.4	69.7	74.9	56.8	69.1	7.94	21.17	....
1940.....	9.9	16.0	54.1	85.5	61.8	68.2	7.58	21.73	....
1941.....	17.0	26.4	80.7	94.0	75.1	94.5	9.67	47.65	....
1942.....	19.0	36.9	117.0	119.0	91.7	109.8	10.80	45.61	....
1943.....	19.9	40.5	131.0	204.0	112.0	136.0	14.80	52.10	....
1944.....	20.7	42.0	149.0	192.0	109.0	141.0	16.40	52.70	....
1945.....	21.2	36.6	143.0	204.0	127.0	150.0	15.10	51.10	....
1946.....	28.3	38.2	124.0	219.0	136.0	185.0	17.30	71.40	....
1947									
March.....	31.89	33.6	139.0	235.0	150.0	244.0	17.40	88.00	....
April.....	32.26	30.1	147.0	233.0	163.0	240.0	17.20	88.00	....
May.....	33.50	44.6	153.0	233.0	159.0	239.0	16.80	83.70	....
June.....	34.07	46.0	156.0	249.0	185.0	218.0	16.00	79.60	....
July.....	35.88	48.5	169.0	251.0	201.0	214.0	15.10	79.00	....
August.....	33.15	38.1	161.0	270.0	219.0	210.0	15.30	75.50	....
September...	31.21	40.7	149.0	240.0	240.0	243.0	16.10	75.60	....
October.....	30.65	41.6	150.0	205.0	223.0	266.0	16.80	90.60	....
November....	31.87	40.0	166.0	195.0	219.0	274.0	17.30	89.10	....
December....	34.06	46.9	172.0	204.0	237.0	279.0	18.10	94.80	....
1948									
January.....	33.14	45.9	186.0	217.0	246.0	281.0	18.70	95.10	....
February.....	30.71	38.5	193.0	231.0	192.0	212.0	19.60	88.60	....
Index Numbers (Aug. 1909—July 1914 = 100)									
1923.....	231	190	133	137	129	105	110	183	....
1924.....	185	190	98	170	166	141	107	147	143
1925.....	158	168	245	188	109	163	108	140	143
1926.....	101	179	189	134	116	138	112	98	139
1927.....	163	207	146	124	132	135	87	154	127
1928.....	145	200	76	134	131	113	95	152	154
1929.....	135	183	189	133	124	117	92	137	137
1930.....	77	128	131	123	93	76	93	98	129
1931.....	46	82	66	83	50	44	73	40	115
1932.....	52	105	55	62	50	43	52	46	102
1933.....	82	130	118	79	81	84	68	57	91
1934.....	100	213	64	91	127	96	111	146	95
1935.....	90	184	85	80	102	94	63	135	119
1936.....	100	236	164	106	163	116	94	148	104
1937.....	68	204	76	93	81	109	74	87	110
1938.....	69	196	80	83	76	64	57	97	88
1939.....	73	154	100	85	88	78	67	94	91
1940.....	80	160	78	97	96	77	64	96	111
1941.....	137	264	116	107	117	107	81	211	129
1942.....	153	369	168	136	143	124	91	202	163
1943.....	160	405	188	232	174	154	125	231	245
1944.....	167	420	214	219	170	160	138	234	212
1945.....	171	366	205	232	198	170	127	227	224
1946.....	228	382	178	249	212	209	146	317	204
1947									
March.....	257	336	199	268	234	276	147	390	299
April.....	260	301	211	265	254	271	145	390	295
May.....	270	446	220	265	248	270	142	371	286
June.....	275	460	224	284	288	247	135	353	215
July.....	289	485	242	286	313	242	127	350	189
August.....	267	381	231	308	341	238	129	335	211
September...	252	407	214	273	374	275	136	335	179
October.....	247	416	214	233	347	301	142	402	238
November....	257	400	238	222	341	310	146	395	272
December....	275	469	247	232	369	316	152	420	294
1948									
January.....	267	459	267	247	383	318	158	422	320
February.....	248	385	277	263	299	240	165	393	320

Wholesale Prices of Ammoniates

	Nitrate of soda per unit N bulk	Sulphate of ammonia bulk per unit N	Cottonseed meal S. E. Mills per unit N	Fish scrap, dried 11–12% ammonia, 15% bone phosphate, f.o.b. factory, bulk per unit N	Tankage 11% ammonia, 15% bone phosphate, f.o.b. Chicago, bulk, per unit N	High grade ground blood, 16–17% ammonia, Chicago, bulk per unit N
1910–14	$2.68	$2.85	$3.50	$3.53	$3.37	$3.52
1924	2.99	2.44	5.87	5.02	3.60	4.25
1925	3.11	2.47	5.41	5.34	3.97	4.75
1926	3.06	2.41	4.40	4.95	4.36	4.90
1927	3.01	2.26	5.07	5.87	4.32	5.70
1928	2.67	2.30	7.06	6.63	4.92	6.00
1929	2.57	2.04	5.64	5.00	4.61	5.72
1930	2.47	1.81	4.78	4.96	3.79	4.58
1931	2.34	1.46	3.10	3.95	2.11	2.46
1932	1.87	1.04	2.18	2.18	1.21	1.36
1933	1.52	1.12	2.95	2.86	2.06	2.46
1934	1.52	1.20	4.46	3.15	2.67	3.27
1935	1.47	1.15	4.59	3.10	3.06	3.65
1936	1.53	1.23	4.17	3.42	3.58	4.25
1937	1.63	1.32	4.91	4.66	4.04	4.80
1938	1.69	1.38	3.69	3.76	3.15	3.53
1939	1.69	1.35	4.02	4.41	3.87	3.90
1940	1.69	1.36	4.64	4.36	3.33	3.39
1941	1.69	1.41	5.50	5.32	3.76	4.43
1942	1.74	1.41	6.11	5.77	5.04	6.76
1943	1.75	1.42	6.30	5.77	4.86	6.62
1944	1.75	1.42	7.68	5.77	4.86	6.71
1945	1.75	1.42	7.81	5.77	4.86	6.71
1946	1.97	1.44	11.04	7.38	6.60	9.33
1947						
March	2.41	1.46	11.98	11.06	12.50	10.50
April	2.41	1.51	11.72	10.79	12.75	11.39
May	2.41	1.51	10.55	9.98	12.75	8.80
June	2.41	1.51	10.94	9.98	12.75	8.26
July	2.41	1.59	12.56	9.98	12.75	8.66
August	2.53	1.60	13.01	9.98	12.75	8.73
September	2.66	1.73	13.65	10.41	12.75	10.72
October	2.66	1.78	15.00	10.85	12.75	13.66
November	2.66	1.78	14.22	11.06	12.75	11.53
December	2.71	1.78	15.98	11.71	12.75	12.81
1948						
January	2.78	1.83	16.22	11.71	12.75	13.28
February	2.78	1.90	15.03	12.15	12.75	12.60
Index Numbers (1910-14 = 100)						
1924	111	86	168	142	107	121
1925	115	87	155	151	117	135
1926	113	84	126	140	129	139
1927	112	79	145	166	128	162
1928	100	81	202	188	146	170
1929	96	72	161	142	137	162
1930	92	64	137	141	12	130
1931	88	51	89	112	63	70
1932	71	36	62	62	36	39
1933	59	39	84	81	97	71
1934	59	42	127	89	79	93
1935	57	40	131	88	91	104
1936	59	43	119	97	106	131
1937	61	46	140	132	120	122
1938	63	48	105	106	93	100
1939	63	47	115	125	115	111
1940	63	48	133	124	99	96
1941	63	49	157	151	112	126
1942	65	49	175	163	150	192
1943	65	50	180	163	144	189
1944	65	50	219	163	144	191
1945	65	50	223	163	144	191
1946	74	51	315	209	196	265
1947						
March	90	51	342	313	371	298
April	90	53	335	306	378	324
May	90	53	301	283	378	250
June	90	53	313	283	378	234
July	90	56	359	283	378	246
August	94	56	372	283	378	248
September	99	61	390	295	378	305
October	99	62	429	307	378	388
November	99	62	406	313	378	328
December	101	62	457	332	378	364
1948						
January	104	64	463	332	378	377
February	104	67	429	344	378	358

Wholesale Prices of Phosphates and Potash **

	Superphosphate Baltimore, per unit	Florida land pebble 68% f.o.b. mines, bulk, per ton	Tennessee phosphate rock, 75% f.o.b. mines, bulk, per ton	Muriate of potash bulk, per unit, c.i.f. Atlantic and Gulf ports[1]	Sulphate of potash in bags, per unit, c.i.f. Atlantic and Gulf ports[1]	Sulphate of potash magnesia, per ton, c.i.f. Atlantic and Gulf ports[1]	Manure salts bulk, per unit, c.i.f. Atlantic and Gulf ports[1]
1910–14	$0.536	$3.61	$4.88	$0.714	$0.953	$24.18	$0.657
1924	.502	2.31	6.60	.582	.860	23.72	....
1925	.600	2.44	6.16	.584	.860	23.72	....
1926	.598	3.20	5.57	.596	.854	23.58	.537
1927	.525	3.09	5.50	.646	.924	25.55	.586
1928	.580	3.12	5.50	.669	.957	26.46	.607
1929	.609	3.18	5.50	.672	.962	26.59	.610
1930	.542	3.18	5.50	.681	.973	26.92	.618
1931	.485	3.18	5.50	.681	.973	26.92	.618
1932	.458	3.18	5.50	.681	.963	26.90	.618
1933	.434	3.11	5.50	.662	.864	25.10	.601
1934	.487	3.14	5.67	.486	.751	22.49	.483
1935	.492	3.30	5.69	415	.684	21.44	.444
1936	.476	1.85	5 50	.464	.708	22.94	.505
1937	.510	1.85	5.50	.508	.757	24.70	.556
1938	.492	1.85	5.50	.523	.774	15.17	.572
1939	.478	1.90	5.50	.521	.751	24.52	.570
1940	.516	1.90	5.50	.517	.730	24.75	.573
1941	.547	1.94	5.64	.522	.780	25.55	.367[1]
1942	.600	2.13	6.29	.522	.810	25.74	.205
1943	.631	2.00	5.93	.522	.786	25.35	.195
1944	.645	2.10	6.10	.522	.777	25.35	.195
1945	.650	2.20	6.23	.522	.777	25.35	.195
1946	.671	2.41	6.50	.508	.769	24.70	.190
1947							
March	.740	2.75	6.60	.535	.797	26.00	.200
April	.740	2.97	6.60	.535	.797	26.00	.200
May	.740	2.97	6.60	.535	.797	26.00	.200
June	.752	2.97	6.60	.330[1]	.589[1]	12.76[1]	.176
July	.760	2.97	6.60	.353	.629	13.63	.188
August	.760	3.08	6.60	.353	.629	13.63	.188
September	.760	3.42	6.60	.353	.629	13.63	.188
October	.760	3.42	6.60	.375	.669	14.50	.200
November	.760	3.42	6.60	.375	.669	14.50	.200
December	.760	3.42	6.60	.375	.669	14.50	.200
1948							
January	.760	3.42	6.60	.375	.669	14.50	.200
February	.760	3.42	6.60	.375	.669	14.50	.200
Index Numbers (1910-14 = 100)							
1924	94	64	135	82	90	98	....
1925	110	68	126	82	90	98	....
1926	112	88	114	83	90	98	82
1927	100	86	113	90	97	106	89
1928	108	86	113	94	100	109	92
1929	114	88	113	94	101	110	93
1930	101	88	113	95	102	111	94
1931	90	88	113	95	102	111	94
1932	85	88	113	95	101	111	94
1933	81	86	113	93	91	104	91
1934	91	87	110	68	79	93	74
1935	92	91	117	58	72	89	68
1936	89	51	113	65	74	95	77
1937	95	51	113	71	79	102	85
1938	92	51	113	73	81	104	87
1939	89	53	113	73	79	101	87
1940	96	53	113	72	77	102	87
1941	102	54	110	73	82	106	87
1942	112	59	129	73	85	106	84
1943	117	55	121	73	82	105	83
1944	120	58	125	73	82	105	83
1945	121	61	128	73	82	105	83
1946	125	67	133	71	81	102	82
1947							
March	138	76	135	75	84	108	83
April	138	82	135	75	84	108	83
May	138	82	135	75	84	108	83
June	140	82	135	60	62	53	80
July	142	82	135	64	66	56	82
August	142	85	135	64	66	56	82
September	142	95	135	64	66	56	82
October	142	95	135	68	70	60	83
November	142	95	135	68	70	60	83
December	142	95	135	68	70	60	83
1948							
January	142	95	135	68	70	60	83
February	142	95	135	68	70	60	83

Combined Index Numbers of Prices of Fertilizer Materials, Farm Products and All Commodities

	Farm prices*	Prices paid by farmers for commodities bought*	Wholesale prices of all commodities†	Fertilizer material‡	Chemical ammoniates	Organic ammoniates	Superphosphate	Potash**
1924.....	143	152	143	103	97	125	94	79
1925.....	156	156	151	112	100	131	109	80
1926.....	146	155	146	119	94	135	112	86
1927.....	142	153	139	116	89	150	100	94
1928.....	151	155	141	121	87	177	108	97
1929.....	149	154	139	114	79	146	114	97
1930.....	128	146	126	105	72	131	101	99
1931.....	90	126	107	83	62	83	90	99
1932.....	68	108	95	71	46	48	85	99
1933.....	72	108	96	70	45	71	81	95
1934.....	90	122	109	72	47	90	91	72
1935.....	109	125	117	70	45	97	92	63
1936.....	114	124	118	73	47	107	89	69
1937.....	122	131	126	81	50	129	95	75
1938.....	97	123	115	78	52	101	92	77
1939.....	95	121	112	79	51	119	89	77
1940.....	100	122	115	80	52	114	96	77
1941.....	124	131	127	86	56	130	102	77
1942.....	159	152	144	93	57	161	112	77
1943.....	192	167	151	94	57	160	117	77
1944.....	195	176	152	96	57	174	120	76
1945.....	202	180	154	97	57	175	121	76
1946.....	233	203	177	107	62	240	125	75
1947								
March.....	280	240	216	128	70	354	138	78
April.....	276	243	215	129	71	354	138	78
May.....	272	242	215	127	71	339	138	78
June.....	271	244	215	125	71	343	140	63
July.....	276	244	219	128	72	359	142	67
August....	276	249	223	130	75	364	142	67
September.	286	253	230	133	79	372	142	67
October...	289	254	230	136	80	387	142	71
November.	287	257	231	135	80	380	142	71
December..	301	262	236	138	81	400	142	71
1948								
January...	307	266	242	139	83	403	142	71
February..	279	263	233	139	85	395	142	71

* U. S. D. A. figures. Beginning January 1946 farm prices and index numbers of specific farm products revised from a calendar year to a crop-year basis. Truck crops index adjusted to the 1924 level of the all-commodity index.

† Department of Labor index converted to 1910-14 base.

‡ The Index numbers of prices of fertilizer materials are based on original study made by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York. These indexes are complete since 1897. The series was revised and reweighted as of March 1940 and November 1942.

[1] All potash salts now quoted F.O.B. mines only: manure salts since June 1941, other carriers since June 1947.

**** The weighted average of prices actually paid for potash are lower than the annual average because since 1926 over 90% of the potash used in agriculture has been contracted for during the discount period. Since 1937, the maximum discount has been 12%. Applied to muriate of potash, a price slightly above $.471 per unit K_2O thus more nearly approximates the annual average than do prices based on arithmetical averages of monthly quotations.**

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"Commerical Fertilizer Sales as Reported to Date for Quarter Ended December 31, 1947," Bu. of Chem., State Dept. of Agr., Sacramento 14, Calif., FM-159, Feb. 24, 1948.

"Agricultural Mineral Sales as Reported to Date for Quarter Ended December 31, 1947," Bu. of Chem., State Dept. of Agr., Sacramento 14, Calif., FM-160, Feb. 24, 1948.

"Fertilizing Idaho Soils for Conservation, Efficiency, Profits," Ext. Div., College of Agr., Univ. of Idaho, Moscow, Idaho, Ext. Cir. No. 100, Sept. 1947.

"Commercial Fertilizers, 1947," Agr. Exp. Sta., Orono, Maine, Official Inspections 205, Oct. 1947, Elmer R. Tobey.

"Maryland Fertilizer Facts for 1947," State Inspection and Regulatory Service, College Park, Md., March 12, 1948.

"Fertilizer Analyses and Registrations," State Dept. of Agr., St. Paul, Minn., 1947, H. A. Halvorson.

"Report of Analyses of Commercial Fertilizers and Lime Materials Sold in New York State January 1 to December 31, 1946," State Dept. of Agr. and Markets, Albany, N. Y., July 1947, Bul. 361.

"Fertilizer Recommendations for 1948 Oklahoma Crops," Agr. Exp. Sta., Okla. A. & M., Stillwater, Okla., Bul. B-318, Jan. 1948, H. J. Harper, H. F. Murphy, F. B. Cross and H. B. Cordner.

"The Use of Fertilizer and Supplemental Materials in the Production of Bermuda Onions," Agr. Exp. Sta., Texas A. & M., College Station, Texas, P. R. 1096, Oct. 25, 1947, Bruce A. Perry.

"Virginia's Field and Truck Crop Fertilizer Recommendations," Agr. Exp. Sta., Va. Polytechnic Inst., Blacksburg, Va., Cir. 341 (Rev.), Jan. 1948.

Soils

"Hints on Dry Land Gardening," Dominion Dept. of Agr., Ottawa, Can., Publ. 619, Cir. 132, Nov. 1947 Revision, Erdman Braun and Charles Walkof.

"Practical Gravel Culture," Agr. Exp. Sta., Colo. A. & M., Fort Collins, Colo., Misc. Series Paper 370.

"Fertility Status of Potato Soils of Aroostook County, Maine, and Relation to Fertilizer and Rotation Practices," Agr. Exp. Sta., Univ. of Maine, Orono, Maine, Bul. 454, July 1947, Arthur Hawkins, Joseph A. Chucka, and A. J. MacKenzie.

"Results of Tests on Vegetated Waterways, and Method of Field Application," Agr. Exp. Sta., Okla. A. & M., Stillwater, Okla., Misc. Publ. No. MP-12, Jan. 1948, Maurice B. Cox and Vernon J. Palmer.

"Lime Supplies in West Virginia," Agr. Exp. Sta., Morgantown, W. Va., Bul. 329, June 1947, C. E. Stockdale.

"Soil Survey of the Newman Area, California," U. S. D. A., Washington, D. C., Series 1938, No. 11, Jan. 1948, Ralph C. Cole, R. A. Gardner, Frank F. Harradine, and F. C. Eggers.

"Soil Survey of the Akron Area, Colorado," U. S. D. A., Washington, D. C., Series 1938, No. 14, Nov. 1947, E. W. Knobel, Lindsey A. Brown, Dale Hodgell, Clinton Bourne, E. L. McPherron, F. M. Paxton, Charles A. Black, Irving Brown, James Jay, W. E. Haines, and Frank Viets.

"Soil Survey of Smyth County, Virginia," U. S. D. A., Washington, D. C., Series 1938, No. 16, Jan. 1948, R. C. Jurney, A. C. Orvedal, E. F. Henry, H. H. Perry, Edward Shulkcum, P. B. Douglas, J. R. Moore, A. M. Baisden, and M. M. Phillippe.

Crops

"Tenth Progress Report, 1944-1945," Agr. Exp. Stations, Univ. of Alaska, College, Alaska, Free Bulletin, Jan. 1, 1947.

"Almond Culture in California," Agr. Ext. Serv., Univ. of Calif., Berkeley, Calif., Cir. 103, Rev. Jan. 1947, Milo N. Wood.

"Irrigated Pastures in California," Agr. Ext. Serv., Univ. of Calif., Berkeley, Calif., Cir. 125, Rev. June 1947, Burle J. Jones and J. B. Brown.

"House Plants," Exp. Farms Serv., Dominion Dept. of Agr., Ottawa, Can., Publ. 798, Farmers' Bul. 145, Nov. 1947, Wm. Godfrey.

"Research Goes to Market," Agr. Exp. Sta., Colo. A. & M., Fort Collins, Colo., 60th Annual Report, 1946-1947.

"Short Cuts in Growing Pompon Mums," Hort. Sect., Agr. Exp. Sta., Colo. A. & M., Fort Collins, Colo., Misc. Series Paper No. 364, August Mussenbrock.

"Pecan Growing in Florida," Agr. Exp. Sta., Univ. of Fla., Gainesville, Fla., Bul. 437 (A Rev. of Bul. 191) Oct. 1947, G. H. Blackmon.

"Composition of Florida-Grown Vegetables, I. Mineral Composition of Commercially Grown Vegetables in Florida as Affected by Treatment, Soil Type and Locality," Agr. Exp. Sta., Univ. of Fla., Gainesville, Fla., Bul. 438, Nov. 1947, G. T. Sims and G. M. Volk.

"Kudzu," Agr. Exp. Sta., Experiment, Ga., Press Bul. No. 575, Nov. 6, 1946, Julius M. Elrod.

"Forest Plantations, Their Establishment, Growth and Management," Agr. Exp. Sta., Purdue Univ., Lafayette, Ind., Sta. Cir. 331, Feb. 1948, Daniel DenUyl.

"Sugarcane," Ext. Serv., Miss. State College, State College, Miss., Ext. Leaflet 80 (5M), Oct. 1947.

"Use Sorgo (Sweet Sorghum) for Sirup," Ext. Serv., Miss. State College, State College, Miss., Ext. Leaflet 81 (10M), Nov. 1947.

"Grow More Corn—Join Mississippi's 100-Bushel Corn Club," Ext. Serv., Miss. State College, State College, Miss., Ext. Leaflet 82 (25M), Jan. 1948.

"Tomato Varieties, Poplarville, 1944-46," Agr. Exp. Sta., Miss. State College, State College, Miss., Inf. Sheet 371, July 1946, T. E. Ashley.

"Cabbage Varieties, South Mississippi Branch Station, Poplarville, 1944-46," Agr. Exp. Sta., Miss. State College, State College, Miss., Inf. Sheet 372, July 1946, T. E. Ashley.

"Cabbage Varieties, 1947," Agr. Exp. Sta., Miss. State College, State College, Miss., Inf. Sheet 397, Sept. 1947, John A. Campbell and Walter A. Hills.

"Winter Legumes for Cotton Production in the Yazoo-Mississippi Delta," Agr. Exp. Sta., Miss. State College, State College, Miss., Service Sheet 406, Sept. 1947, Perrin Grissom.

"Potato Varieties Tested in Nebraska in 1946," Agr. Exp. Sta., Univ. of Nebr., Lincoln, Nebr., Hort. P. R. #8, Jan. 1947, H. O. Werner.

"Varieties of Peas Tested at Lincoln, Nebraska, in 1943, 1944, 1945," Agr. Exp. Sta., Univ. of Nebr., Lincoln, Nebr., Hort. P. R. #9, Feb. 1947, H. O. Werner.

"Is Rotational Grazing on Native Range Practical?" Agr. Exp. Sta., Univ. of N. C., Raleigh, N. C., Bul. 360, May 1947, H. H. Biswell and J. E. Foster.

"Measured Crop Performance, 1947," Agr. Exp. Sta., Univ. of N. C., Raleigh, N. C., Bul. 361, Jan. 1948, H. L. Cooke and R. P. Moore.

"A Description of Tobacco Varieties for North Carolina," Agr. Ext. Serv., Univ. of N. C., Raleigh, N. C., Ext. Cir. 302, June 1947, Roy R. Bennett and H. R. Garriss.

"Planting for the Future," Agr. Ext. Serv., Univ. of N. C., Raleigh, N. C., Ext. Cir. 305, Dec. 1947, John H. Harris.

"Reforestation in Ohio," Agr. Exp. Sta., Wooster, Ohio, Spec. Cir. 76, Dec. 1947, Robert R. Paton.

"Tree Fruit for Oklahoma," Ext. Serv., Okla. A & M College, Stillwater, Okla., Cir. 452, E. L. Whitehead.

"Landscaping Home Grounds," Ext. Serv., Okla. A & M College, Stillwater, Okla., Cir. No. 456, J. C. Garrett.

"Grapes for Oklahoma," Ext. Serv., Okla. A & M College, Stillwater, Okla., Cir. 457, E. L. Whitehead.

"Bramble Fruits," Ext. Serv., Okla. A & M College, Stillwater, Okla., Cir. 458, E. L. Whitehead.

"Preliminary Study of Tree Plantations in Oklahoma: Relative Survival by Species, and Factors Affecting Survival," Agr. Exp. Sta., Okla. A. & M., Stillwater, Okla., Tech. Bul. No. T-29, Jan. 1948, M. Afanasiev.

"Chemical Composition of Sorghum Plants at Various Stages of Growth, and Relation of Composition to Chinch Bug Injury," Agr. Exp. Sta., Okla. A. & M., Stillwater, Okla., Tech. Bul. No. T-30. Feb. 1948, James E. Webster, John Sieglinger, and Frank Davies.

"Filbert Tree Decline and Loss, Causes and Control," Agr. Exp. Sta., Oregon State College, Corvallis, Oregon, Sta. Cir. 172, July 1947, P. W. Miller and C. E. Schuster.

"Rose Culture," Agr. Ext. Serv., Pa. State College, State College, Pa., Cir. 311, Dec. 1947, A. O. Rasmussen.

"Peacetime Farming in South Carolina, 1946," Agr. Ext. Serv., Clemson Agr. College, Clemson, S. C., Annual Report, 1946.

"A Select List of Varieties of Fruits and Vegetables," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn., Cir. No. 84, Issued May 1943 (Rev. March 1945; Nov. 1947), Brooks D. Drain.

"Ornamentals for Southwest Texas," Agr. Exp. Sta., Texas A & M College, College Station, Texas, Bul. No. 695, Oct. 1947, E. Mortensen.

"Rhodes Grass in Texas," Agr. Exp. Sta., Texas A & M College, College Station, Texas, Cir. No. 116, Sept. 1947, R. C. Potts and R. L. Hensel.

"Hairy Vetch Production in the West Cross Timbers Area," Agr. Ext. Serv., Texas A & M College, College Station, Texas, B-155, 1947, E. A. Miller, W. M. Nixon, Jno. R. Stough and C. V. Griffin.

"Texas Rescue 46 Is a Better Strain of Rescue Grass," Agr. Exp. Sta., Texas A & M College, College Station, Texas, P. R. 1094, Oct. 15, 1947, George C. Warner and R. L. Hensel.

"Seabreeze Wheat," Agr. Exp. Sta., Texas A & M College, College Station, Texas, P. R. 1095, Oct. 23, 1947, E. S. McFadden and W. H. Friend.

"Peach Orchard Soil Management Studies," Agr. Exp. Sta., Utah State Agr. College, Logan, Utah, Bul. 330, Feb. 1948, A. L. Stark and D. W. Thorne.

"Research in Farming, The 1946-1947 Annual Report," Agr. Exp. Sta., Va. Polytechnic Inst., Blacksburg, Va., Dec. 20, 1947.

"Save Grain in Feeding Livestock," Ext. Serv., Va. Polytechnic Inst., Blacksburg, Va., Cir. 462, Oct. 1947.

"Grow More—Save More," Ext. Serv., Va. Polytechnic Inst., Blacksburg, Va., Cir. 464, Oct. 1947.

"Sugar Beet Production in Irrigated Central Washington," Ext. Serv., State College of Wash., Pullman, Wash., Ext. Bul. No. 365, Dec. 1947, C. Emil Nelson and Everette Kreizinger.

"Results of Hybrid Corn Yield and Fertilizer Trials in West Virginia for 1947," Agr. Exp. Sta., W. Va. Univ., Morgantown, W. Va., Mimeo. Cir. No. 59, Feb. 1948, J. L. Cartledge, E. H. Tyner, R. J. Friant, and B. M. Ritter.

"Muscadine Grapes," U. S. D. A., Washington, D. C., Farmers' Bul. No. 1785, Issued Jan. 1938 (Rev. Nov. 1947).

"Report of the Secretary of Agriculture, 1947," Washington, D. C., Sept. 30, 1947.

Economics

"Avocado Situation in California, 1947," Agr. Exp. Sta., Univ. of Calif., Berkeley, Calif., Cir. 372, Sept. 1947, Wallace Sullivan.

"Statistical Supplement to Agricultural Experiment Station Circular 372—Avocado Situation in California, 1947," Contribution from the Giannini Foundation of Agricultural Economics, Agr. Exp. Sta., Univ. of Calif., Berkeley, Calif., Sept. 1947, Wallace Sullivan.

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"Statistical Supplement to Agricultural Experiment Station Circular 373—California Asparagus Economic Status, 1947," Contribution from the Giannini Foundation of Agricultural Economics, Agr. Exp. Sta., Univ. of Calif., Berkeley, Calif., Sept. 1947, Sidney Hoos and H. Fisk Phelps.

"Connecticut Vegetable Acreages 1945-1946-1947," Dept. of Farms and Markets, State Dept. of Agr., Hartford, Conn., Bul. No. 98, Dec. 1947.

"Economic Possibilities of Sweetpotatoes as a Feed Crop," Agr. Ext. Serv., Univ. of Hawaii, Honolulu, T. H., Ext. Cir. No. 233, Dec. 1947, Ralph Elliott.

"Incomes on Typical Farming Systems in Torrance County, 1946," Agr. Exp. Sta., N. M. A. & M. College, State College, N. M., Press Bul. 1017, Nov. 1947, P. W. Cockerill.

"Farmer Worker Relationships in Northern Rensselaer County, New York—58 Farms, Northern Rensselaer County, New York, 1946-47," Agr. Ext. Serv., Cornell Univ., Ithaca, N. Y., A. E. 588, Aug. 1947, T. N. Hurd and C. Herman Welch, Jr.

"Factory Meets Farm in North Carolina," Agr. Exp. Sta., Univ. of N. C., Raleigh, N. C., Tech. Bul. No. 83, Oct. 1947, Francis E. McVay.

"Farm Mechanization in the Piedmont," Agr. Exp. Sta., Univ. of N. C., Raleigh, N. C., Tech. Bul. 84, Aug. 1947, R. E. L. Greene, H. Brooks James, and C. G. Dawson.

"Oklahoma Farm Production Prospects for 1948," Agr. Exp. Sta., Okla. A & M College, Stillwater, Okla., Mimeo. Cir. No. M-171, Oct. 1947.

"Farm Organization and Financial Progress in the Willamette Valley," Agr. Exp. Sta., Oregon State College, Corvallis, Oregon, Sta. Bul. 444, Feb. 1947, G. B. Davis and D. C. Mumford.

"Publications, Dept. of Agr. Econ. and Rural Sociology," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn., Rural Research Series, Mono. No. 60 (9th Rev.), Sept. 20, 1947.

"Woodlands and Farm Economy of East Tennessee," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn., Bul. No. 204, June 1947, R. F. Kroodsma.

"Cost and Efficiency of Producing Sugar Beets in Utah, 1945," Agr. Exp. Sta., Utah State Agr. College, Logan, Utah, Bul. 329, Jan. 1948, Earnest M. Morrison.

"Vermont Cooperatives, Their Business Activities," Agr. Exp. Sta., Univ. of Vt., Burlington, Vt., Bul. 540, Jan. 1948, Thurston M. Adams.

"Virginia Farm Real Estate Situation," Agr. Exp. Sta., Blacksburg, Va., Bul. 411, Oct. 1947, W. H. Scofield and H. M. Love.

"Report of the Chief of the Bureau of Dairy Industry, Agricultural Research Administration, 1947," U.S.D.A., Washington, D. C., Sept. 1, 1947.

"Report of the Chief of the Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, 1947," U.S.D.A., Washington, D. C., Sept. 15, 1947.

"Report of the Chief of the Office of Experiment Stations, Agricultural Research Administration, 1947," U.S.D.A., Washington, D. C., Sept. 15, 1947.

"Report of the Administrator of the Commodity Exchange Authority, 1947," U.S.D.A., Washington, D. C., Oct. 20, 1947.

"Report of the Manager of the Federal Crop Insurance Corporation, 1947," U.S.D.A., Washington, D. C.

"Report of the Solicitor to the Secretary of Agriculture, for the Fiscal Year Ending June 30, 1947," U.S.D.A., Washington, D. C.

"Important Recent Achievements of Department of Agriculture Scientists," Office of Information, U.S.D.A., Washington, D. C., No. 6, Rev. Jan. 1, 1948.

"Apple Production by Varieties 1945, 1946 and 1947," Bureau of Agr. Econ., U.S.D.A., Washington, D. C., Jan. 1948.

"Flaxseed in American Farming," Bu. of Agr. Econ., U. S. D. A., Washington, D. C., Tech. Bul. No. 938, Nov. 1947, Weber H. Peterson.

"Report of the President of the Commodity Credit Corporation, 1947," U. S. D. A., Washington, D. C.

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"Annual Report on Tobacco Statistics, 1947," Prod. and Marketing Admin., U. S. D. A., Washington, D. C., Nov. 1947.

"The 1948 Agricultural Conservation Program Handbook for: ACP-1948-Mass.; ACP-1948-Nev.; ACP-1948-P.R.; ACP-1948-Vt.; ACP-1948-V.I.," U. S. D. A., Washington, D. C.

"The 1948 Agricultural Conservation Program Handbook for: ACP-1948-Ariz.; ACP-1948-Ark.; ACP-1948-Hawaii; ACP-1948-Ill.; ACP-1948-Ind.; ACP-1948-Iowa; ACP-1948-La.; ACP-1948-Md.; ACP-1948-Minn.; ACP-1948-Mont.; ACP-1948-N.H.; ACP-1948-N.J.; ACP-1948-New Mexico; ACP-1948-N.D.; ACP-1948-Oreg.; ACP-1948-Pa.; ACP-1948-R.I.; ACP-1948-Tenn.; ACP-1948-Utah; ACP-1948-Va.; ACP-1948-Wash.; ACP-1948-W.Va.; ACP-1948-Wis.; ACP-1948-Wyo.," U.S.D.A., Washington, D. C.

Practical Field Crop Production for the Northeast

"Practical Field Crop Production for the Northeast" is the title of new book published by Rutgers University Press, New Brunswick, New Jersey, and priced to sell at $4 per copy. The authors—Gilbert H. Ahlgren, Robert S. Snell, John C. Anderson, and Milton A. Sprague, all research specialists connected with Rutgers University—have brought together a wealth of interesting and valuable information with the student of Northeastern agriculture in mind. In other words this is a textbook on soil, crop, and climatic conditions of the area designed for the use of teachers of crops in high schools, vocational schools, and for non-degree courses in the agricultural colleges. Filling a long-felt need, it is assured that many copies also will go into the hands of farm operators.

The arrangement of the chapters as well as the masterly treatment each has received leaves little to be desired by either the teacher or student. Aside from the simplicity and directness of presentation, all chapters are well supported by tables, graphs, pictures, a glossary, and an index. These, together with appropriate chapter summaries, suggestions for project activities, and pertinent reading references, give this book an enviable position among the textbooks suitable for the teaching of field crops in the Northeastern States. The authors are to be congratulated for the success of their efforts in adapting scientific findings to the practical educational needs of this region.

Winter Grazing Increases . . . Livestock Profits

(*From page* 26)

These data look more encouraging when we consider that this experiment was conducted on low price land. Returns of $18 per acre on relatively cheap land point to the opportunities that are available in Mississippi and the South in terms of livestock production.

Greater returns can be shown from an acre of good winter forage by a farmer engaged in the dairy business. Data shown in Table 3 indicate the value of winter grazing in the production of milk. Five dairy cows on winter grazing and 4 pounds of dairy feed produced more than 5,000 pounds of milk and a net return of $276.50 during

TABLE 2.—COMPARISON OF BEEF STEERS ON WINTER GRAZING WITH STEERS FED IN DRY LOT IN THE SANDY COASTAL PLAIN SECTION *

Groups	Length of period	Total wt. on Nov. 6	Total wt. on May 20	Average daily gain in lbs.	Total value Nov. 6	Total value May 20	Cost of fertilizer seed, labor, or feed	Net returns	Value of winter grazing per acre
1. Steers in Dry Lot.....	Nov. 6 to May 20	3,950#	5,290#	0.8	$533.38	$952.20	$556.61	$137.79	.....
2. Steers on winter grazing..	Nov. 6 to May 20	4,065#	6,035#	1.14	548.81	1,086.39	350.00	187.58	$18.76

* J. B. Gill: Mississippi Farm Research—October Issue 1947, State College, Mississippi.

a 3½-month period. A similar lot of dairy cows fed dairy feed and no winter grazing produced 2,762 pounds of milk and a net return of only $6.00. These data show the value of winter grazing to the dairy farmer and indicate the possibility of high production during the winter months without investing much money in high-priced feed. The fact that animals can be fed in the fields on growing crops will enable the South to produce much more beef and milk than has been produced heretofore.

Another great advantage of this agricultural endeavor from a financial standpoint is that it makes it possible for the farmer to market fat cattle in the spring as well as in the fall. The price of this grade of beef cattle is usually higher in the spring than in the fall because generally there are not so many fat cattle for sale just after the winter has passed. By utilizing sufficient acres of average land in the production of winter-grazing crops which are consumed by beef cattle, the farmer can shift his market period from the fall, when cattle are usually plentiful, to the spring. This will enable him to take advantage of the seasonal peak price period which will mean more income on the farm. This practice also has the advantage of fitting into most farm enterprises without interfering or reducing the other cash crops that are normally grown. On many farms there are usually idle acres that should be put to work and protected from soil erosion. Winter-grazing crops or improved pastures for summer grazing can be developed on many of these acres. When properly mineralized and seeded many of these acres will provide income for the farmer equal to the income provided by the good land and protect the soil

TABLE 3.—RESULTS OF DAIRY COWS ON WINTER-GRAZING CROPS **

Groups	No. cows	Lbs. Milk Nov. 15–Feb. 28	Value of Milk	Cost of Feed	Cost of seed and fertilizer	Returns above cost of feed, seed and fertilizer	No. of acres of winter-grazing crops
A.....	5	5,368	$429.44	$ 70.44	$82.50	$276.50	5
B.....	5	4,570	365.60	157.00	82.50	126.10	5
C.....	5	2,762	221.00	215.00	.....	6.00	.....

*A—Cows on winter grazing plus 4 pounds of feed daily.
B—Cows on winter grazing plus 9 pounds of feed daily.
C—Cows fed 12 pounds of feed and no winter grazing.
** J. B. Gill: Mississippi Farm Research, October 1947.

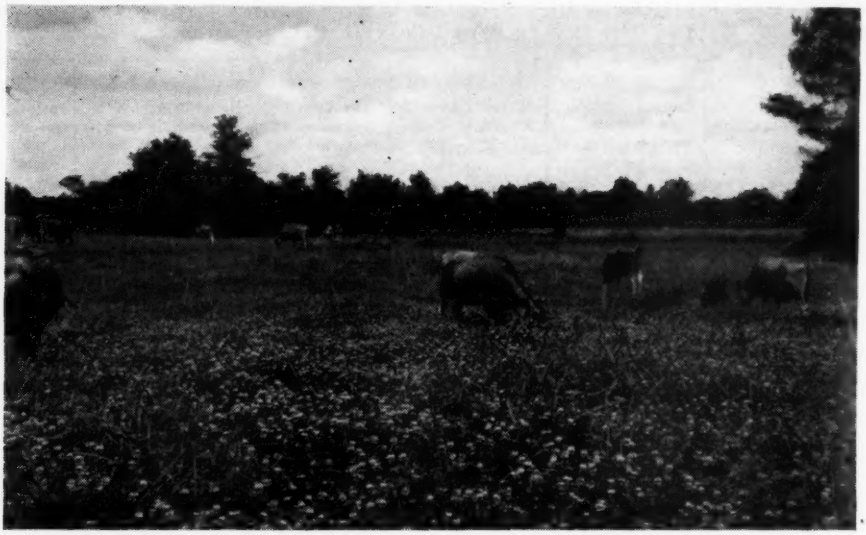

Fig. 10. Good pastures in the summer are necessary for a year-round grazing program.

as well. With good winter grazing to bridge the gap between fall and spring pastures, year-round grazing is no longer a distant fantastic dream in the South but a happy reality.

The growing and grazing of winter forage crops will no doubt bring about many problems that will have to be handled by farmers. The idea that growing winter-grazing crops will solve all agricultural problems should never be portrayed. Any new agricultural practice brings new problems just as the use of sulfa drugs and penicillin brought about some problems in the medical profession. But in spite of the problems that may evolve, the practice still has possibilities of helping the South cease to be the number one economic problem area of the nation and develop rapidly into a land of opportunity.

Organic Matter and Our Food Supply

(*From page* 22)

Our current modern literature contains great volumes of facts showing what happens to the organic content of soils through our farming operations. Here are some interesting facts from Dr. H. Jenny from the University of Missouri. He points out that in general the organic matter content in soils would decline about 25 per cent in the first 20 years of farming. The organic matter content would decline on the average about 40 per cent in the first 70 years or about 50 per cent in the first 100 years of farming. This is where we are today on most of our farms. Where there was little to start with, things are in a tough shape. In the richest areas the shoe pinched badly last year.

Since cultivation increases the rate at which organic matter will burn up in the soil, it is interesting to know that for every ton of organic matter turned into the soil about one-half of it's weight, on a dry basis, will rot out in two to three weeks, and three-fourths of it will rot in six weeks during the growing season. Since organic matter

rots out so fast we need to carefully handle our crop rotations so as to have this rotting occur at seasons of greatest advantage to a new growing crop, which in itself will grow new organic matter.

Dr. Firman Bear of the New Jersey Station gives data showing that the organic matter content in the fence row of a field was 3.45 per cent. The cultivated field adjacent had about one-half this quantity. Just this small difference in organic matter content made the moisture-holding capacity of the soil in the fence row higher than that in the field by about 4.5 per cent. If one should convert this into equal inches of rainfall, it amounts to about .7 acre inches of water. This is not a minor matter when summer drouths come.

Professors C. E. Millar and L. M. Turk of Michigan State College point out clearly how the organic matter in soils is related to the supply of important plant-food nutrients: "The humus level in mineral soils is very closely associated with the supply of the nutrient elements, such as calcium, phosphorus, potassium, and nitrogen. Since plant residues are the source of nearly all the soil humus, the quality of plant growth and hence the rate of humus formation will depend to a large extent upon the supply of available plant food in the soil."

Dr. Bear says the same thing from another angle: "Of particular significance is the discovery that fertilizers, even though they may contain no organic matter, are one of the most fruitful means of adding organic matter to the soils, by reason of the more abundant residues and roots of crops that have been liberally treated with them."

Experiments show that it takes chemical plant foods to make organic matter. Moreover, with lots of humus in the soil the added fertilizers work best. There are many data to show that the loss of rainwater by running off the ground is extremely high, and especially on soils that are compacted and deficient in organic matter. Of course, we all know the value of having the soil covered with some kind of crop. The spring rains are sometimes of great intensity for a few minutes, as high as at the rate of 10 or more inches per hour. During this great intensity as much as 80 per cent of the water that falls on the ground may run off. Not only is there, therefore, a great loss of water that the soil would need later in the summer, but the water running off the ground does untold damage in erosion and in carrying away plant nutrients.

Summary

We can summarize in a "nutshell" some of the main points in the following manner: When soils are low in organic matter their porosity is poor, and much of the rain that should go into the ground runs away. When soils are low in organic matter they do not have a large capacity for holding available moisture, so that when mild dry spells come the crops will suffer for lack of water. When soils are low in organic matter they are very deficient in available nitrogen, and crops usually starve for this nutrient with the consequence that they will be low in protein content. When soils are low in organic matter they become hard and compacted, so that roots have a difficult time in growing through the soil to pick up plant nutrients. Furthermore, the air space will be so slight that the roots easily starve for the lack of oxygen. When roots starve for oxygen they die and the crop is correspondingly injured. When soils are low in organic matter the crop yields are seriously reduced and the yields obtained are very inefficient. When soils are low in organic matter the response of crops to added fertilizer is not as good as when the soils are high in organic matter, because it takes a good root system to use applied fertilizers to best advantage.

When soils are low in organic matter

Fig. 3. This is creating an estate for others and a profit for himself.

farming becomes inefficient, price supports become more necessary, bank accounts become rare, purchasing power becomes smaller, malnutrition is more prevalent, people want more government aid, and meatless and eggless days become common without a Presidential plea. This is a solution we can attain through far greater education both in high and low places on the more constructive meaning of our modern sciences.

Farm Problems of the Cotton Belt

(*From page* 14)

proximately 19,000 gallons of milk were produced. The value of milk alone was nearly $11,000. Also there were sold 10 cull cows for about $750. Homegrown heifers replaced the culls. Total cash expenses of record for fertilizer, seed, concentrates, etc., were approximately $1,300. There was probably an additional $200 cash cost that should be charged, but it could not be definitely separated from the cost of other operations on the Station. After deducting out-of-pocket costs, there was a balance of approximately $10,250. All labor costs, depreciation, taxes, etc., would need to be paid. But, when it is recalled that two men could handle this entire unit, it is apparent that they would have a pretty good income from the operation. And, this was all done about 25 miles from Mobile, a city that at times has looked to Minnesota and Wisconsin for a part of its supply of milk.

Nearly all of the cows in this herd are grade cows. A number of them are producing from 6,000 to 7,000 pounds of milk per year, in spite of the fact that we have been told that our climate is not very suitable for high milk production. From our own experience and judging the matter as laymen, we know that, if we supply cows with adequate amounts of feed and maintain sanitary conditions, milk production in the South even to the Gulf Coast may be as profitable as in any other section of the country. The

results obtained fully justify this conclusion.

The Alabama Agricultural Experiment Station system has in operation 10 production units similar to those just described. They are serving as a general basis for the farm program that is developing in our State. These units are attracting more attention from farmers than any other type of activity of the Station. The various units of the system attracted more than 28,000 visitors in organized groups in 1947. There were thousands of visitors who came a few at a time that are not included in this total. These farmers are being shown a production program in operation—one that they may copy or use with modifications to fit their conditions.

We feel that, in our effort to improve the agriculture of Alabama, it is entirely ineffective to try to interest farmers in improving their lot by a piecemeal procedure. Farmers who have produced cotton as the chief enterprise on their farms have had a very simple program —one that requires but little planning. But, when only one additional enterprise is added, this planning becomes more complicated; and if it is a livestock enterprise, it is much more complicated. Animals must be fed and cared for on a year-around basis. If the added livestock enterprise is to succeed, there must be adequate acreages of forage, hay, grain, and pasture crops. All of the parts must be fitted into a whole operation—into a farming program. It is our opinion that we are expecting a lot of farmers if they are left to their own initiative to fit into over-all farming programs such things as development of enough acres each of improved pastures, feed and temporary grazing crops, and soil improvement and increased yields.

If these programs are not adequate with respect to both kind and amount of grazing and feeds produced, the newly attempted livestock enterprises will fail. A farmer who has had such an experience usually goes back to cotton with a never-again attitude. The Alabama Station believes that through the operation of its several production units, farmers will be helped to add new enterpises with less risk of failure than by any other means.

Now let's come to the conclusion of the whole matter. No one denies that Southern farmers have far too little income. Many of us believe that they can have a much better return for the use of their land and for a day's work. If we can do little or no better than divide our present income among a reduced farm population, we will still be a very, very poor people. Those who subscribe to the idea that this is our best chance for economic improvement fail utterly to realize the potential but undeveloped possibilities in Southern agriculture.

The data presented from the Alabama production units point the way to a possible doubling of the farm income in our State, based on the present farm population. Farmers of other Southern States surely can do as well. All that is needed is a clear-cut understanding of our major problems, some of which have been discussed in this paper, and a firm decision to tackle these problems so vigorously that they may be solved in the not far distant future. Then the South will not be the No. 1 Economic Problem area of the Nation.

Responsibilities

The responsibility for the solution of these problems falls heavily on the Experiment Stations of the Southern States. However, all Federal Bureaus of the U. S. Department of Agriculture have a responsibility to help. This is the job both State and Federal researchers are paid to do.

But, after we in the research field have done the best possible job, there still remains the job of education. Just as the manufacturer must dispose of his product, so must the results of research work be taken to the consumer—the farmer. This is all-important. The educational work that needs to be done in

the South is now much more complicated than it was when cotton was the chief cash crop. Each new enterprise calls for new information, and the adult teaching program must expand to keep pace with the expansion of the research program. For example, we now know that we may grow alfalfa on hundreds of thousands of acres of land where it was thought impossible 12 years ago. Just as soon as a farmer has a field of alfalfa, there develop questions about grazing that he never needed to think about before. Then may come worms or insects to try to destroy his crop. He must have information on these. All are new problems to him—and to all the agricultural workers who are trying to help him with his program. Likewise, if he adds hog or milk production to his farming program to consume this alfalfa and the other pasture, feed, and forage crops needed, think of the vast number of additional things the farmer must learn to do—and do both well and on time!

It goes without saying that the hired help engaged in assisting with the educational program must keep ahead of his farmer constituent. All of this points up to the fact that agricultural workers in the South have at once an almost unlimited opportunity and a corresponding responsibility. We all must feel our responsibility so keenly that we shall be determined not to fail Southern farmers in their time of greatest need.

A 5,000-Acre Water Garden?

(*From page* 18)

crops growing therein. The concentrations of nitrogen, phosphorus, and potassium associated with satisfactory crops were roughly comparable to those used in water cultures.

2. Considerable quantities of solutes, particularly potassium, were removed from the marshes in 1947 by the drainage pumps.

3. There was evidence of mass movements of solutes in both horizontal and vertical directions. It is possible that fertilizers bought by one man may be utilized by the crops of another.

Courtesy, Dept. of Public Relations, Ontario Agricultural College

Fig. 3. An onion harvest like this bespeaks the value of proper management on the Holland-Bradford marshes.

Needs of the Corn Crop

(*From page* 20)

There are areas especially in the northern part of the corn belt, and probably in other localities, where the corn must have a small amount of readily available fertilizer added to give it a satisfactory start. This is essential, but this starter fertilizer, wherever used, must not be confused with the reserve of available fertility in soils which finally makes a corn crop of the 100-bushel-per-acre proportions.

It was revealed in some field tests that corn made approximately 75% of its increase in total growth after the latter part of July when the first tassels appear. During this growth period, from first tassels to maturity, the corn took from the soil approximately 70% of its total nitrogen, phosphorus, and potassium. These conditions prevailed on land which had a good crop rotation and where the soil held a rather large reserve of fertility. Part of this reserve was that of the natural corn-belt fertility. The other part was put in the soil by several years of good crop rotations and well-planned applications of fertilizers. This land was capable of producing grain of high quality and a yield even above the 100-bushel-per-acre level.

On land where both soil and crop rotation were neglected, the corn made only about 50% of its increase in total growth after the first tassels began to appear July 23. This corn took from the soil approximately 33% of its nitrogen, 40% of its phosphorus, and only 10% of its potassium supply between the first tassel and maturity. The average grain yield from this mistreated land averaged around 20 bushels per acre.

To a great many casual observers it may appear that corn in the corn belt is merely planted, then allowed to grow, and finally is harvested and stored in various shapes and sizes of cribs. Very few of us fully realize the vast amount of hard experience, scientific planning, and thorough management there is back of each hill of corn.

Legumes Improve Drainage and Reduce Erosion

(*From page* 8)

ing rains, resists erosion, and absorbs more water than bare soils. Vegetation slows down runoff, which reduces the amount of soil that can be carried. The water has more time to soak into the soil and the soil is more absorptive because it is kept open by the plant roots. All our soils were covered by some kind of vegetation before they were cultivated. Long-time cultivation, really not so long in the Corn Belt, has changed our soils both chemically and physically so that we can no longer hope to grow cultivated crops year after year without getting into trouble.

A large percentage of the particles in fine-textured soils must exist in clusters, or granules, if they are to possess desirable properties. Some of these granules are water stable, that is they do not break apart when water comes in contact with them. They will even resist the force of raindrops to quite an extent. These stable granules seem to be associated with organic matter and plant roots and perhaps also with soil organisms.

The only satisfactory way known to improve the physical condition of our soils is to grow sod crops part of the time. Even soils on level topography will deteriorate if kept in intertilled crops all of the time. The problem seems to be—How much of the time

Fig. 3. Plowing under heavy sweet clover, using equipment owned and operated by Kenneth Royer, New Richmond, Indiana.

must a soil be kept in sod crops to maintain the structure in a satisfactory condition? Improving the physical condition so soils will drain and reducing erosion by vegetation are preferable to mechanical means.

Up to now I have been discussing vegetation in general. Grasses have a very good effect on the physical condition of the soil and for the best results probably should be included with legumes in most rotations. Grasses are rather shallow-rooted and do not extend deep enough to loosen up some of the compacted layers that have been developing in soils. The reasons legumes should be grown are probably known to most of you. They add nitrogen to the soil under proper conditions, and for the most part they are deeper rooted than grasses. I want to make clear, however, that all legumes are not deep-rooted and do not affect the soil to any great depth. Soybeans are an example of shallow-rooted legumes.

Sweet clover and alfalfa are our best examples of deep-rooted legumes. Their roots extend down into the subsoil in soils that do not have an impermeable claypan or hardpan subsoil. They have a beneficial effect by opening up the soil and by placing organic matter rather deeply in the soil by means of their roots.

TABLE 1.—EFFECT OF DIFFERENT CROPPING SYSTEMS ON WATER ABSORPTION AND SOIL EROSION (1), (2)

	Duration of experiment	Av. annual rainfall	Water absorbed	Soil lost per year	Years to lose one inch soil
	Years	*Inches*	*Inches*	*Tons*	
Soil kept bare, uncultivated	6	38.68	18.3	34.6	5
Corn, annually	14	40.37	28.1	19.7	7
Wheat, annually	14	40.37	30.7	10.1	14
Corn, wheat, clover rotation	14	40.37	34.8	2.7	52

TABLE 2.—EFFECT OF DIFFERENT CROPPING SYSTEMS ON SOIL AGGREGATION AND CROP YIELDS (3)

Cropping system	Degree of Aggregation %	Corn Yield Bu/A
Corn, oats, alfalfa-bromegrass (2 yr.)	54.2	67.9
Corn, oats, alfalfa	53.0	58.8
Corn, oats (sweet clover)*	45.2	46.9
Corn, oats (residues removed)	40.1	32.3
Corn (residues removed)	23.4	25.9

* Two-year rotation; sweet clover catch crop.

How do legumes improve drainage? Deep-rooted legumes, alfalfa and sweet clover, open up the soil and permit water to be absorbed rather than standing on the surface until it evaporates or runs off. Their roots penetrate the compacted layers that are developing in many of our better soils which permits the water to drain through these layers. How do legumes reduce erosion? They protect the soil from the force of raindrops which toss the soil particles in the air and make it easy for the water to carry them away. They promote granulation which makes the soil absorb water more readily, thus reducing the amount of runoff. They slow down the movement of water over the surface, thus reducing the amount of soil it can carry. Because of their beneficial effects deep-rooted legumes should be included in crop rotations.

Let us examine some results that have been secured by growing deep-rooted legumes. The first and one of the most informative experiments in measuring runoff and erosion losses from field soils was begun in 1917 at the Missouri Agricultural Experiment Station. Results secured from four cropping systems—bare soil, corn every year, wheat every year, and a rotation of corn, wheat, and clover—are sufficient to show the effect of a crop rotation, including clover, on the amount of water absorbed and the loss of soil by erosion.

An experiment conducted by the Ohio Agricultural Experiment Station shows rather striking effects of different cropping systems on soil aggregation and crop yields. The soil on which this experiment is carried on is a heavy clay on nearly level topography. It has given little response to fertilizers. The chief problem seems to be that under cultivation the physical condition deteriorates rapidly if deep-rooted legumes are not included in the cropping system. The results given in Table 2 are averages for the years 1941, 1943, and 1945. The experiment was started in 1936.

Infiltration determinations made in Iowa on Marshall silt loam show how much more water is absorbed by soil growing alfalfa than by bare soil. Marshall silt loam is a highly productive, permeable soil, formed from loess. The results of infiltration studies made on this soil are given in Table 3.

The soil on the Morrow Plots at the Illinois Agricultural Experiment Station shows the effect of cropping and fertilization on the physical condition of the soil. Samples of surface soil from the plot receiving fertilizer and on which a rotation of corn, oats, and red clover is followed, permitted twice as much water to pass through in a given length of time as a similar amount of soil from the plot growing corn continuously (5). The corn plot does not receive fertilizer. These determinations were made in the laboratory and indicate nothing more than relative differences.

The number of examples given to show the effects of clovers and alfalfa

TABLE 3.—INCHES OF WATER ABSORBED PER HOUR (4)

	Alfalfa 3rd year	Bare soil
1st hour	0.88	0.33
2nd hour	0.67	0.13
3rd hour	0.69	0.13
3 hours	2.24	0.59

on the physical condition of soils could be multiplied many times. These are probably sufficient to show that cropping systems which do not include grasses and deep-rooted legumes will permit the physical condition of the soil to deteriorate to the point where subsurface drainage will become a problem and erosion will be accelerated. This is especially true of silt loams and finer-textured soils even though they have a permeable profile to begin with.

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Exit the Equine

(*From page* 5)

we met a snorting steam tractor hauling a separator to another stand, when Father would trudge on ahead leading the equipage past the road demon, over which Kit pretended to be much alarmed.

And thus we proceeded to our journey's end, making the 35 miles in about six hours. Our weariness and tardiness or our grimy and unkempt looks could not be blamed on inanimate, mechanical contrivances or upon some inept motor repair man, as it is now.

Of course, we sometimes took the "stage." The driver was usually a retired liveryman. The small boy rode up ahead with the driver, unless there was a pretty schoolma'am on the passenger list. At such times the space on the front seat was strictly reserved. Perhaps the sole comfort for us when we took the stage instead of our own outfit was the chance to see the struggles of another driver with perverse horses and miserable roads.

If perchance some of our youthful zealots found some appeal in the careers of overland stage drivers, and pictured themselves holding a skein of lines over the restless hoofs of triple teams hitched to a glorious western carry-all, this fancy was eclipsed by the swashbuckling airs of our home-town hotel bus brigade.

Tired passengers alighting from any of our "four trains daily" found half a dozen hotel hacks lined up at the edge of the depot platform. Almost before the conductor and brakemen hit the gravel, these vociferous jehus began their sing-song, shouting loudly the rival claims for high living for a low fee which would come to him who took a free ride with them to their respective hostelries. As soon as the disheveled victims had yielded their baggage to these intrepid greeters, the whole outfit turned tails and larruped down the rutty streets at a speed calculated to discourage any captive guest from jumping out before his name had been scrawled on the dingy hotel register.

Today the only remnant of this motley crew of jays is the piratical taxi pilot, who rides his victims all around town to reach a designated hotel, only to find every room taken and reservations ignored.

Another sacred memory of the departing horse centers in country town funerals. We have lived through scores of them, albeit we do not hope to maintain that record forever. Here indeed

was a line of duty wherein the plodding horse was in his element, as contrasted with the enforced slow motion and burning headlights common to modern obsequies. Family teams and livery turnouts were in their glory at such times. With such equipages it was no trouble to maintain the dignity and solemnity so well fitted to the last ride behind a fellow citizen. I recall but one instance of bad judgment with colts, which ended in an upset hearse; but luckily, it held the remains of one who had "lived fast" and who delighted in racing steeds.

Obsequies for the respected townsman bring to mind the welcome for the statesman or the conquering hero, whose rare visits to our bailiwick meant milestones of history. When the shining personality arrived, hack driver in charge let down the top so that all our gawping denizens might bask in the radiance of his smiles. No confusing glassy reflections or limousine exclusiveness hid the public servant from his admiring supporters during those brilliant day parades and evening torchlight processions.

For a time it looked as though the milk-wagon man would thumb his nose at progress and stick stoutly to the horse, regardless of pasteurization, homogenization, marketing agreements, and other lactic innovations. When milk dispensers toted their wares around in tall cylindrical cans stacked in a light wagon, a steady old nag was needed to keep the contents from slopping over. This advantage plus the wisdom and cunning of the trained horse, who acquired such knowledge of his daily milk route that he would stop or zigzag across streets to serve customers, acted to keep equine power for dairies much longer than for other lines. But now, with sealed bottles and carton containers the rule, and handy, low-hung, easy-driven motor trucks in vogue, the days of the dairy horse are numbered.

Brewery and dray horses were among the last of the draft tribe to quit the teeming city streets. You probably share with me the local pride evinced by country-towners in the well-matched and handsome, rugged teams who "drew our brew" in gurgling kegs from depot to the saloons or from the brewery to the tavern. You may also recall that doughty and muscular owner of a line of drays, Mike Lafferty by name, who prided himself on three things—stout horses, bulging biceps, and a minimum of wear and tear on pianos and hardware. He and his faithful equines are listed among the lost, their places taken by huge caravans of mammoth, swiftly moving trucks, trundling all night long to link the distant metropolis with the hamlets in the hills. Moreover, merchants often get their goods direct without requiring short hauls from the local railroad warehouse.

Gone are the cob, the pony, and the family driving horse, no longer holding tyrannical sway. The natty turnouts and four-in-hands infrequently appear in our parks, driven by those who think they can afford them as a luxury. More generally, however, these light-horse outfits are used in a professional effort to reawaken interest at some of our state fairs and livestock shows. Usually they are tuned to meet the demands of high-toned society. The masses attending our pumpkin shows lean elsewhere for their thrills.

THE biggest crowds are seen looking at road-burning auto races and barrier-smashing motor dashes, or leaps from burning airplanes. Uptown the old-time hitching posts and tie-racks have yielded to compressed air tanks on the principal corners of the courthouse square.

Over there where our friend the village blacksmith rapped his resonant anvil in days gone by, a vulcanizer of rubber tires gives off his smoke and smell, and a skillful restorer of busted radiators and bent fenders overcharges you with nonchalant aplomb. The G. A. R. and other later veterans ride to the exercises in silent sixes and are

finally mustered out to glide heavenward in the mortuary's motor catafalque. Even the infant newly born is fetched home in a gas-powered conveyance, and will see no other kind of locomotion in all his future years. We who were born at home and first went sight-seeing in a lumber wagon belong indeed to the same era that witnessed the halcyon days of the horse or the mode of the mule.

MOST hopeless of shibboleths vainly conjured was the phrase once used, "Back to the buggy." Who of any consequence or of any pretentious ambitions cares to go back to the buggy? I don't and Youth never will—and Youth must make the times ahead of us.

Except in some sequestered southern valleys or among old tortuous mountain roads, the buggy has almost become extinct. Here and there you see one hidden to the battered top in tall ragweed, with its busted cushions affording a great haven for rats and mice. Once I paused with my kids to pronounce a silent benediction over such a relic, and in doing so I felt like an antiquary, but the youngsters imagined I was touched with the current heat.

We have one good friend of the horse and buggy days left over at Dearborn, Michigan, where the late Henry Ford spent much money to collect and display all the styles and contraptions which went along with the horse in its heyday. Yet he has within that varnished interior no skeleton or bit of taxidermic art to illustrate the source of power that pulled the plow and provided us with pleasant courting equipment.

Nevertheless, for all these roaring changes to a day of quicker trips, I still maintain that the good old mare had her compensations. My son, for instance, cannot ever hope to find his automobile mothering a brand new, recreated model, which isn't able to get its nose to the ground. Much as we get used to certain autos, none of them will prick up their ears and whinny when you reach for the door handle. And smoothing a glossy metal auto body with polishing cloth somehow does not give you the sense of warm and vibrating companionship, and even kinship, that you once felt when smoothing the nose and forelock of a dutiful drafter.

Best of all, do you remember how you used to crawl into the haymow on summer afternoons to get out of work, and lie up there listening to the chumping and munching of the horse-grinders taking their noonday meal? It wasn't half as noisy and nerve wracking as the blub and dither that goes on around a garage; while the feed you gave the horses and mules finally turned up as field manure to make more crops—which nary a motor car can ever provide.

BUT oh my and dear suz, progress must go on and all this looking backward won't do you or me or the horse any lasting good. I suppose our chances of saving the soil and keeping up all our good works on the farm are in much better hands with the tractor agent and the implement repair man than they were with the aids afforded by the draft-horse era. Some say it won't be as cheap, but few people look for cheap things nowdays. They want results.

It's far nicer for us elderly codgers to be broad-minded about denying ourselves horse collars and hames and belts and buckles and breeching to monkey around with on rainy days. If we really get low spirited maybe we can go away back in the rear of the library stacks and find us a copy of Black Beauty.

We can read in that book awhile and imagine we are again leading some favorite colt to water down by the bubbling spring, before we go home and clean the blamed grease spots off the driveway and check the gasoline in the car—and find a flat tire to take our minds off the horse that cast its shoe.

AVAILABLE LITERATURE

The following literature on the use of fertilizers in profitable soil and crop management is available for distribution. We shall be glad to send these upon request and in reasonable amounts as long as our supply lasts.

Circulars

Tomatoes (General)
Asparagus (General)
Vine Crops (General)
Sweet Potatoes (General)
Better Corn (Midwest) and (Northeast)
The Cow and Her Pasture (General)

Reprints

N-9 Problems of Feeding Cigarleaf Tobacco
F-3-40 When Fertilizing, Consider Plant-food Content of Crops
S-5-40 What Is the Matter with Your Soil?
H-12-42 Wartime Contribution of the American Potash Industry
J-2-43 Maintaining Fertility When Growing Peanuts
Y-5-43 Value & Limitations of Methods of Diagnosing Plant Nutrient Needs
FF-8-43 Potash for Citrus Crops in California
A-1-44 What's in That Fertilizer Bag?
H-2-44 Efficient Fertilizers for Potato Farms
AA-8-44 Florida Knows How to Fertilize Citrus
QQ-12-44 Leaf Analysis—A Guide to Better Crops
P-3-45 Balanced Fertility in the Orchard
Z-5-45 Alfalfa—the Aristocrat
DD-5-45 A Case of Combined Potassium and Boron Deficiencies in Grapes
GG-6-45 Know Your Soil
OO-8-45 Potash Fertilizers Are Needed on Many Midwestern Farms
TT-10-45 Kudzu Responds to Potash
ZZ-11-45 First Things First in Soil Fertility
H-2-46 Plow-sole Placed Plant Food for Better Crop Production
S-4-46 Plow-under Fertilizer Ups Corn Yields
T-4-46 Potash Losses on the Dairy Farm
Y-5-46 Learn Hunger Signs of Crops
AA-5-46 Efficient Fertilizers Needed for Profit in Cotton
BB-5-46 The Soil Is Our Heritage
HH-6-46 Mistakes Versus Essentials of Pond Management for Fish
NN-10-46 Soil Testing—A Practical Aid to the Grower & Industry
WW-11-46 Soil Requirements for Red Clover
ZZ-12-46 Alfalfa—A Crop to Utilize the South's Resources
A-1-47 Fertilizing Vegetables by Applying Fertilizer to Preceding Cover Crop
B-1-47 The Use of Dipicrylamine in Tissue Testing for Potash
G-2-47 Research Points the Way for Higher Corn Yields in North Carolina
I-2-47 Fertilizers and Human Health
K-2-47 Potash Pays for Peas at Chehalis, Washington
N-3-47 Efficient Management for Abundant Pastures
P-3-47 Year-round Grazing
Q-4-47 Fertilizers for Sugar Beets
S-4-47 Rice Nutrition in Relation to Stem Rot of Rice
T-4-47 Fertilizer Practices for Profitable Tobacco
V-4-47 Don't Feed Alfalfa at the "Second Table"
X-5-47 Potato-growing Developments in New England
Y-5-47 Increasing Grain Production in Mississippi
Z-5-47 Building and Maintaining Good Lawns
AA-5-47 The Potassium Content of Farm Crops
BB-5-47 More Palatable Grass Is More Nutritious
DD-6-47 Profitable Soybean Yields in North Carolina
FF-6-47 Community Cooperation in Soil Conservation
GG-6-47 Corrective Measures for the Salinity Problem in Southwestern Soils
II-8-47 Whole-farm Demonstrations
JJ-8-47 Analyzing the Soils of Northwest Louisiana
KK-8-47 Minor Plant Nutrients
LL-8-47 Reshaping New England Farm Land
MM-8-47 Fertilizing Potatoes Economically in Aroostook County, Maine
NN-10-47 Let's Replace Guessing with Soil Testing
PP-10-47 Potash Fertilization of Alfalfa in Connecticut
QQ-10-47 Fertilizer Placement for Corn on Sandy Soils of Minnesota
SS-10-47 Soil Fertility and Management Govern Cotton Profits
TT-11-47 How Different Plant Nutrients Influence Plant Growth
UU-11-47 Fertilizer Practice for the Ranger Sweet Potato
VV-11-47 Are You Pasture Conscious?
WW-11-47 At the Tip of the Shoot and the Point of the Root
XX-11-47 Fall and Winter Grazing in Mississippi
YY-11-47 Boron for Vermont Farms
ZZ-11-47 Some Things to Think About
AAA-12-47 Soil Aeration and Crop Response to Fertilizers—1947
BBB-12-47 The Management of Mint Soils
CCC-12-47 Do Soybeans Cause Clover Failures?
DDD-12-47 Florida Grows Good Pasture on Coastal Plain Soils
A-1-48 Let's Foster Fertility
B-1-48 Potash Supplies for 1948
C-1-48 Fertilizers Double and Treble Grain Yields in Northern Wisconsin
D-1-48 A Good Combination: Lespedeza Sericea and Crimson Clover
E-2-48 Root Rot of Sweet Clover Reduced by Soil Fertility
F-2-48 Swapping Plant Food for Corn
H-2-48 Soil Testing and Soil Conservation
I-2-48 Success with Alfalfa in Alabama
J-2-48 The New Frontier for Midwestern Farmers

THE AMERICAN POTASH INSTITUTE
1155 16TH STREET, N. W. WASHINGTON 6, D. C.

A beautiful girl, emerging from the secluded pool where she had been enjoying a swim a la natural, heard a rustling in the bushes. "Who's there?"

"Willie."

"How old are you, Willie?"

"Eighty-nine, dern it!"

A three-year old and his father were being pushed toward the rear of a rapidly filling elevator. A kindly woman turned to the father and said, "Aren't you afraid your little boy will be crushed?"

"Not a chance, lady," answered the father. "He bites."

A good many years ago, in the early days of the automobile, a Southern Negro was sent to deliver a mule a few miles away. It was night and the owner of the mule cautioned, "Now, Sam, if you see a light coming down the road, you get the mule off to one side until it goes by."

The next day, after diligent search and inquiry Sam was located in a hospital, undergoing heavy repairs. "Sam," inquired the owner of the mule, "why didn't you do as I said, and drive off to one side until that light went by?"

"Ah aimt' do dat boss," replied Sam, "but they was two lights, so Ah took aim fo' de middle!"

Sal—"Cantcha ever say anything romantic, Slim?"

Slim—"Shore, gal. You're more like a rose than anything I ever smelt."

Five-year-old Janie had picked up some swear words and her exasperated mother said that the next time she used such language she'd have to leave the house. There was a next time, of course. Janie was promptly ordered out of the house.

She sat down on the front steps for a while, and presently a neighbor lady approached.

"Is your mother home?" asked the neighbor.

"Damned if I know," said Janie, "I don't even live here."

NOT QUITE RIGHT

Teacher (to history student): "You want to know why you didn't pass in your history test? Well, your answer to the question, 'Why did the Pilgrims go into the wilderness' was interesting from the standpoint of sanitation, but it was still incorrect."

Sweet Young Thing: "Please, could you tell me where I could get some silk covering for my settee?"

Floorwalker: "Two aisles down and one over for the lingerie department."

INDIGESTION

Laundress: "Ay ban sorry Ay couldn't coomb yesterday, Missus Yohnson, but Ay had sooch a pain."

Mrs. McHunt: "What was it, dyspepsia?"

Laundress: "Vell, ma'am, it muss ben soomting Ay eat. Da doctor call it acute indiscretion."

FERTILIZER BORATE

more economical

FOR AGRICULTURE

Authorities have recognized that the depletion of Boron in soil has been reflected in limited production and poor quality of numerous field and fruit crops.

Outstanding results have been obtained with the application of Borax in specific quantities, or as part of the regular fertilizer mix, improving the quality and increasing the production of alfalfa and other legumes, table beets, sugar beets, apples, etc.

The work and recommendations of the State Agricultural Stations and County Agents are steadily increasing the recognition of the need for Boron in agriculture.

Boron is a plant food element and is commonly obtained from Borax since the element does not occur in the pure form. Fertilizer Borate is a semi-refined product containing 93% Borax.

Fertilizer Borate was placed on the market by the makers of "20 Mule Team Borax" as a fertilizer grade product to save cost of refining and hence to supply Borax at the lowest cost.

Fertilizer Borate is packed in 100 lb. sacks. Address your inquiries to the nearest office.

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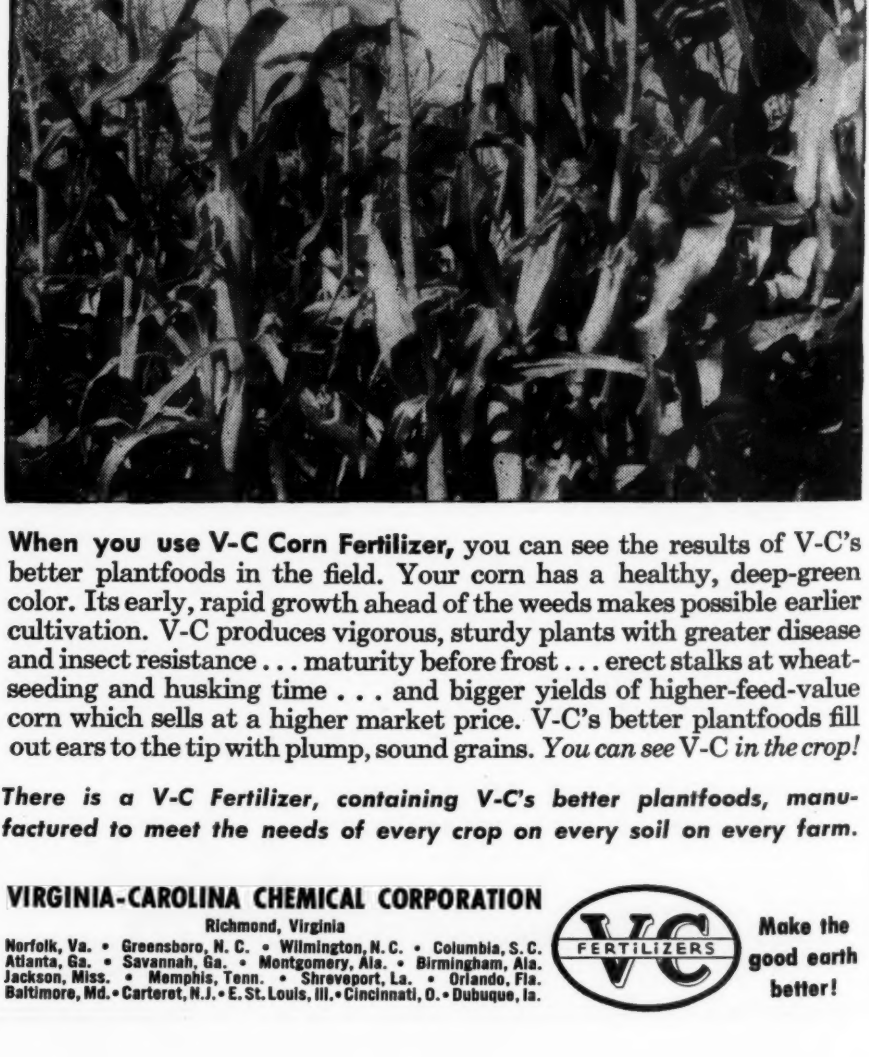

When you use V-C Corn Fertilizer, you can see the results of V-C's better plantfoods in the field. Your corn has a healthy, deep-green color. Its early, rapid growth ahead of the weeds makes possible earlier cultivation. V-C produces vigorous, sturdy plants with greater disease and insect resistance . . . maturity before frost . . . erect stalks at wheat-seeding and husking time . . . and bigger yields of higher-feed-value corn which sells at a higher market price. V-C's better plantfoods fill out ears to the tip with plump, sound grains. *You can see* V-C *in the crop!*

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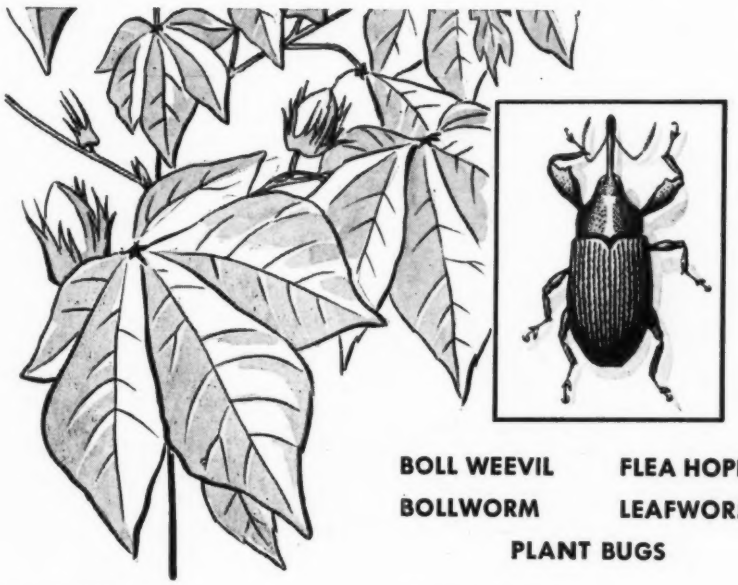

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THE PLANT SPEAKS

A new four-reel series of 16 mm., sound, color films which may be booked independently or in any combination. They may be used to best advantage when shown at least one day apart and in the following sequence:

THE PLANT SPEAKS THRU DEFICIENCY SYMPTOMS pictures soil depletion, erosion, and deficiency symptoms on plants. (Running time 25 min. on 800-ft. reel.)

THE PLANT SPEAKS, SOIL TESTS TELL US WHY depicts taking soil samples on the farm and the interpretation of soil tests. (Running time 10 min. on 400-ft. reel.)

THE PLANT SPEAKS THRU TISSUE TESTS shows the value of tissue testing and the procedure for testing plant tissues in the field. (Running time 14 min. on 400-ft. reel.)

THE PLANT SPEAKS THRU LEAF ANALYSIS evaluates leaves in plant growth and leaf analysis in determining fertilizer needs. (Running time 18 min. on 800-ft. reel.)

We shall be pleased to loan these films to agricultural colleges, experiment stations, county agents, vocational teachers, responsible farm organizations, and members of the fertilizer trade

OTHER 16MM. COLOR FILMS AVAILABLE FOR TERRITORIES INDICATED

- Potash in Southern Agriculture (South)
- In the Clover (Northeast)
- Bringing Citrus Quality to Market (West)
- Machine Placement of Fertilizer (West)
- Ladino Clover Pastures (West)
- Potash from Soil to Plant (West)
- Potash Deficiency in Grapes and Prunes (West)
- New Soils from Old (Midwest)
- Potash Production in America (All)
- Save That Soil (All)
- Borax From Desert to Farm (All)

IMPORTANT

Requests should be made *well in advance* and should include information as to group before which the film is to be shown, date of exhibition (alternative dates if possible), and period of time of loan.

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